DOE/FE-0113

Summary Proceedings

Public Meeting on Increasing Western Participation in the 1989 Clean Coal Technology Solicitation

Cheyenne, Wyoming

December 1988

U.S. Department of Energy
Assistant Secretary for Fossil Energy
Deputy Assistant Secretary for Coal Technology

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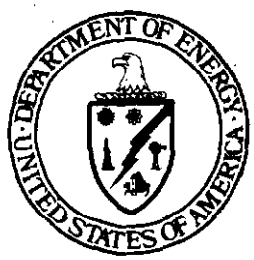

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PUBLIC MEETING

Increasing Western Participation in the 1989 Clean Coal Technology Solicitation

Summary Proceedings

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Introduction

INTRODUCTION:

The Department of Energy's (DOE) Office of Fossil Energy (FE) issued two solicitations offering cost-shared financial assistance for Clean Coal Technology (CCT) demonstration projects: the first Program Opportunity Notice (PON), dated February 17, 1986, yielded 51 proposals, of which only about 8 projects (16 percent) were located in Western states; the more recent PON, issued February 22, 1988 resulted in 55 submittals, with about 10 projects proposed for Western locations (18 percent). Since 55 percent of the Nation's demonstrated reserve base of coal is located in states that are west of the Mississippi River, DOE is concerned that the level of Western participation in the CCT Program is disproportionately low.

Accordingly, the purpose of the DOE Public Meeting in Cheyenne, Wyoming on December 2, 1988 was to seek suggestions from the public for possible means to increase Western-project participation in the third solicitation, which will be issued by May 1, 1989.

The meeting began with introductory remarks and program overviews by government and private sector officials. Discussion workshops led by DOE officials followed. Attendees were asked to engage in informal, unstructured discussions on how to increase the number of western projects that are proposed in response to the forthcoming solicitation. In the closing session, the moderator of each workshop reviewed and summarized the discussion that ensued in his/her workshop.

This report contains remarks of the various speakers, summaries of the discussion workshops, background Clean Coal Technology Solicitation materials, and the conference registration list.

Remarks by J. Allen Wampler

FOSSIL ENERGY SPEECHES

U.S. DEPARTMENT OF ENERGY OFFICE OF FOSSIL ENERGY

Clean Coal Technology

The Role of the West

Remarks by
J. Allen Wampler
Assistant Secretary
for Fossil Energy
U.S. Department
of Energy
to the Public Meeting on Western Participation in the Clean Coal Program in Cheyenne, Wyoming
December 2, 1988

Our purpose is to determine what can be done to increase western participation in the Clean Coal Technology Program. You might say that this is the kick-off of the formal process that will culminate in the issuance of the 3rd Clean Coal solicitation next spring – specifically, by next May.

We have organized this meeting for one specific reason – because we did not get enough Western proposals in the 2nd round of competition, and because given the funding we had available, we could only select one from those that we did receive that was west of the Mississippi River.

Now let me say right from the start that the fact that only one Western project was selected does not mean that the majority of those not selected were bad proposals. They were not. We had an incredible number of high-quality proposals – quite likely more of a high caliber than most of us expected and certainly more than we had funding for. But by the time that funding was allocated, the selected projects were concentrated largely in the East.

We want to spend most of our time today listening to those of you who represent western interests. We want to know, quite simply, what obstacles you saw in the 2nd Clean Coal competition – what precluded more involvement from the West. We want to hear what we can do to remove those obstacles.

And we hope that by listening to what you say and having others hear your opinions—perhaps we will see some concrete action both from the government and by you in industry that will increase the role of western projects in the program beginning next spring.

Now obviously, we can't hear you tell us all these things if we are the ones doing the talking. So my remarks this morning will be brief. What I would like to do is to give you a somewhat broader overview. I would like to spend a few minutes describing what we hope to gain from the Clean Coal program—and why our goals apply both to the East and the West.

Let me start with a 30-second capsule history of the program.

Congress began the program in late 1985 primarily as a way of boosting commercial prospects for coal. The criteria for Round #1—carried out at the direction of Congress—specified that the initial round of competition—at that time, the only round of competition—was for all U.S. coals in all market applications.

We selected 16 projects totalling nearly $1.3 billion—about $537 million of that will be federal funding...only one of those projects was from the West.

At the same time Congress was providing us its initial direction, the U.S. and Canadian Special Envoys delivered their recommendations on an acid rain response program. They called for a $5 billion innovative control technology demonstration effort that would be cost-shared by government and industry.

The President endorsed the Envoys' report in 1986 and in 1987, he called for an expansion of the Congressional Clean Coal program in a manner consistent with the Special Envoys' recommendations. The round of competition that we just completed was the first carried out in direct response to the President's call for an expanded effort. It attempted to conform, as fully as practicable, to the Special Envoys' guidance.

We selected 16 projects totalling nearly $1.3 billion—about $537 million of that will be federal funding. As I said, only one of those projects was from the West.

Now quite obviously, the Special Envoys placed a high priority on reducing transboundary air emissions released from high sulfur coal-burning plants. And they were particularly con-

cerned about older plants – the ones that did not fall under existing Clean Air Act emission requirements. But did the Special Envoys require that all plants funded under the program be in the East?

I think a reading of the language of the Envoys' report tells you that the answer is "no." Let me read you those criteria – and I'm quoting directly from the Envoys' report:

"The federal government should co-fund projects that have the potential for the largest emission reductions, measured as a percentage of SO_2 or NO_x removed. Among projects with similar potential, government funding should go to those that reduce emissions at the cheapest cost per ton.

"More consideration should be given to projects that demonstrate retrofit technologies applicable to the largest number of existing sources, especially existing sources that, because of their size and location, contribute to transboundary air pollution....

The Special Envoys...were indicating that the most important goal of this program was to put into place a new generation of clean coal technologies – not simply to build a group of specific demonstration plants at specific locations.

Furthermore, special consideration should be given to technologies that can be applied to facilities currently dependent on the use of high-sulfur coal." – Unquote.

Now I've emphasized a few of the Special Envoys' words – namely, have the potential for, are applicable to, can be applied to.

The Special Envoys, by using those words, I believe, were indicating that the most important goal of this program was to put into place a new generation of clean coal technologies – not simply to build a group of specific demonstration plants at specific locations.

While they indicated that there should be some near-term reductions in acid rain precursor emissions from these facilities, it is clear that demonstration plants were not the ultimate goal. More important was that new technology be developed that could be applied to the problem of acid rain and contribute to its solution.

The Clean Coal Technology Program is exactly that. It is a demonstration program. By itself, it is not going to solve the acid rain problem. But it will demonstrate the technologies that

can, ultimately, solve the problem.

I firmly believe that we can retain the spirit—and the letter—of the Special Envoys guidelines by siting projects in both the East and the West.

Now, the question is "when we reduced the Special Envoys recommendations to procurement-related criteria, did we tilt the scales?" Or is the issue more one of perception. Did people look at the origins of the program—see that it was a response to acid rain concerns—translate that into an Eastern emphasis—and decide that there was no point in submitting a proposal?

I don't want to see the Clean Coal Technology Program used as a wedge to separate the coal industry. I'm convinced that we are entering a period in this country where literally everything we do will be measured by the consequences it has for the environment.

Or perhaps, a corollary to that is "Was there too much cost entailed in putting together a proposal that prospective Western proposers decided that it wasn't worth the financial investment, given perhaps the misperceptions of the program's intent?" I've put a task force together in our office to look specifically at the question of proposal costs.

Or was it more difficult for the Western coal producer to develop teaming arrangements with architect-engineering firms, equipment manufacturers, and so on?

That's what we want to know today. It is important that we have this information when we start putting together the next solicitation. And that effort will begin within the next few weeks.

And it is important for a much larger reason also.

I don't want to see the Clean Coal Technology Program used as a wedge to separate the coal industry. I'm convinced that we are entering a period in this country where literally everything we do will be measured by the consequences it has for the environment.

Acid rain, CO_2, the quality of our environment in general—all of these issues will become of paramount importance to the American public. But so too will be economic growth, cost of living, the security and reliability of energy supplies, and the quality of life in our society.

It won't be an argument over whether we should use more eastern or western coal, but over whether we should be using any more coal at all. It will be a "growth versus no-growth" argument. And that affects all of the coal industry.

We have the opportunity today to head off that debate. We can put into place a program that returns major dividends to this country.

It is a program that can break the link between concerns over acid rain and increased coal use. It can take us a step toward a CO_2 response program by putting into place more efficient coal technologies.

It won't be an argument over whether we should use more eastern or western coal, but over whether we should be using any more coal at all. It will be a "growth versus no-growth" argument. And that affects all of the coal industry.

It can give us a new generation of power options that can help us sidestep the possible electricity shortfall we see coming in the next few years. And it can put us in a position to use the energy resource we have in most abundance without having to put men in danger to protect vital sea lanes and shipping routes.

But it is a program that will succeed only if it involves the full participation—and support—of all of the coal industry. How we get that participation and support depends largely upon how candid you are about our program and the ways it can be improved. And the success of that program will depend upon your initiative in moving beyond this meeting and forming the teaming arrangements and putting together the proposals that can be contenders in the next round of competition.

That's why we are here today. And that's why we are pleased that you have joined us.

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Remarks by Jack S. Siegel

Remarks by
Jack S. Siegel
Deputy Assistant Secretary for Coal Technology
U.S. Department of Energy

Thank you very much, Allen.

Allen assigned me the responsibility for the implementation of the Clean Coal Technology Program, among other things, and therefore, even though I am accompanied by some of our key people from the DOE's Washington Headquarters, and Morgantown and Pittsburgh Energy Technology Centers who are very intimately involved in this program, if you feel a need to protest the way we have implemented the program so by throwing rotten tomatoes, or rotten eggs, or furniture, or whatever I'm the right target.

There are two reasons for this. Number one, as I mentioned before, I am the person responsible for implementing this program, and number two, I think it would be best if you only had one target for all you rotten food since it will be easier for the people here at this hotel, who have been very hospitable so far, to clean up the mess afterwards.

But seriously, we are here today for very serious business. We do have a major hole in our Clean Coal Technology Program, and if somebody would please turn on the slide projector I have a cartoon here that I think describes best the problem that we have (Figure 1).

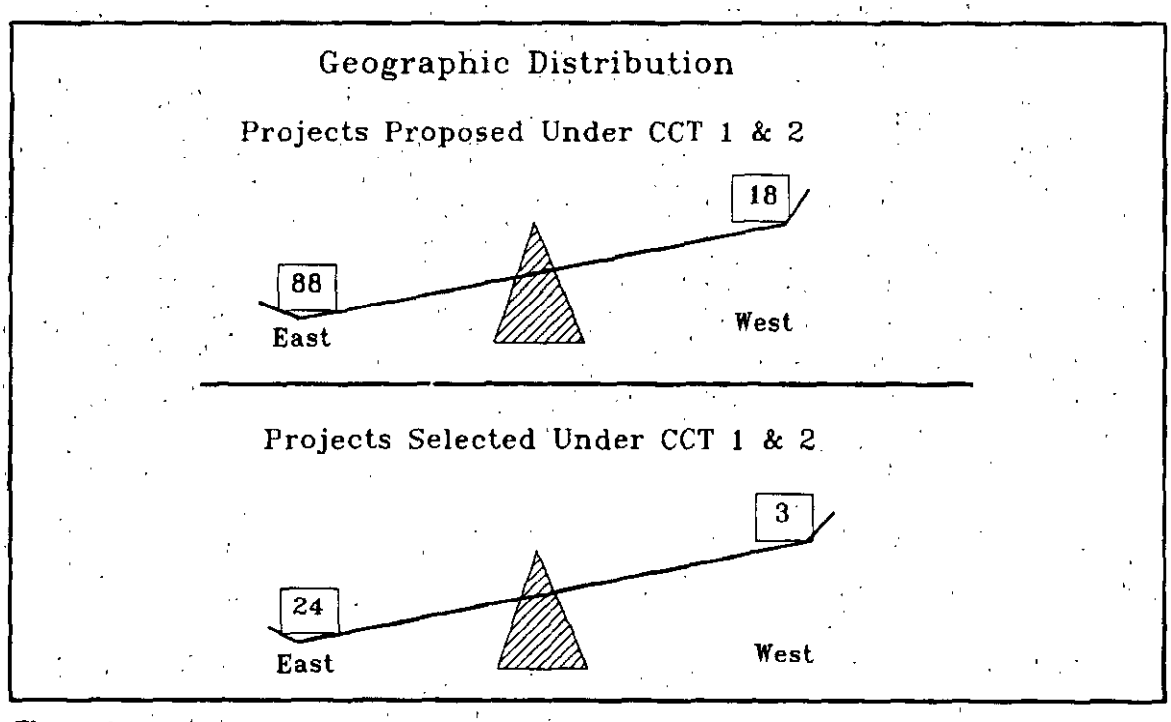

Figure 1

As you can see (Figure 2), in the first two rounds of the Clean Coal Program, very few of the projects proposed, and even fewer of the projects selected, have come from west of the Mississippi River.

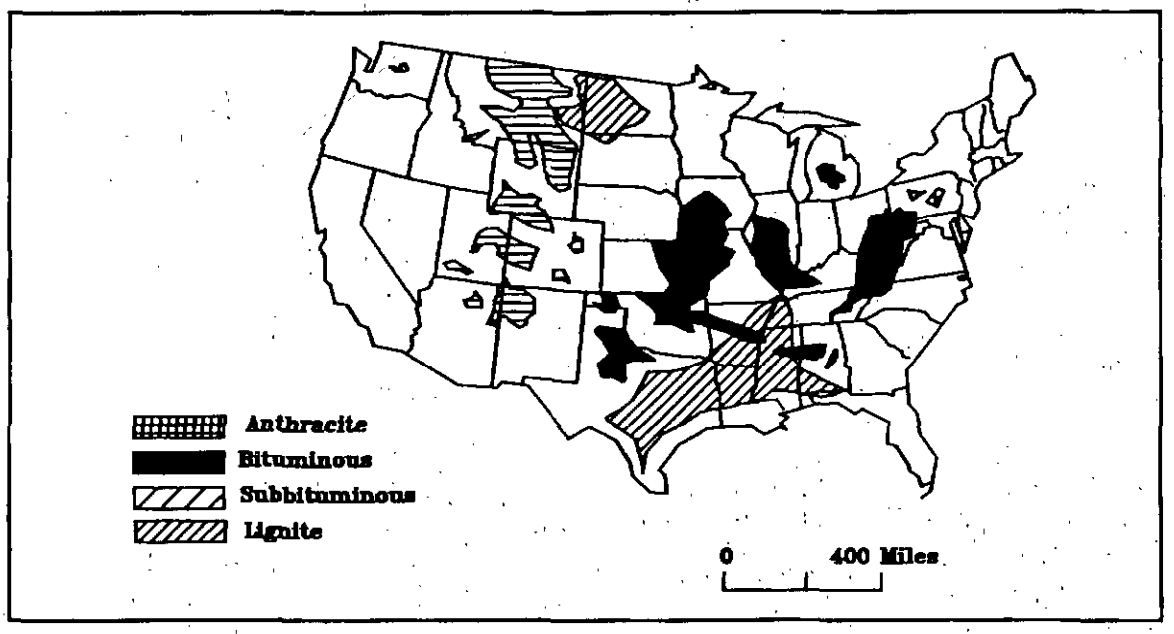

Figure 2

This is in spite of the fact that coal is spread throughout the country, and more than half of the coal reserves in this country are west of the Mississippi River (Figure 3).

DEMONSTRATED U.S. COAL RESERVES BY REGION AND RANK (million tons)

		Bituminous	Sub-bituminous	Anthracite	Lignite	Sub-Total	Total
APPALACHIA	Surface	18,794	-	143	1,083	20,020	111,622
	Deep	84,498	-	7,104	-	91,602	
MID-WEST	Surface	26,108	-	8	3,208	29,324	104,502
	Deep	75,089	-	89	-	75,178	
WEST	Surface	1,951	60,686	-	28,900	91,537	221,558
	Deep	22,271	107,722	28	-	130,021	
TOTAL	Surface	46,853	60,686	151	33,191	140,881	
	Deep	181,858	107,722	7,221	-	296,801	
	Total	228,711	168,408	7,372	33,191		437,682

Measure and indicated deposits, half of which may be considered "recoverable" and are so designated.

Figure 3

At this meeting, we hope to understand what the problems have been with the program so far, and what suggestions you have for dealing with those problems, and hopefully changing that scale, better balancing it for Clean Coal 3.

This morning I'll give a very brief presentation to provide the status of the Clean Coal Program, and to make sure that everybody here is working on a level playing field with respect to what the program is all about, and what the criteria were so far in carrying out the program.

I'll then be followed by Randy Wood, who will be representing the viewpoint of the Western States in giving us some thought on the Western issue. Following Randy will be two Western energy leaders, David Williams and Gary McDowell, who will give us the Western perspective from an industrial viewpoint, and then we'll break up into discussion groups, which is really the meat of the meeting, where we will have an opportunity to hear from you the suggestions you have for improving the program.

We'll then get back together later this afternoon, and the moderators for the breakout sessions will summarize what they've heard, and give you an opportunity to correct any misperceptions that they may have had.

So, with that let me quickly run through the status of the Clean Coal Program and bring you all up to date on it. This chart (Figure 4) lays out the several segments of the Clean Coal Program.

Clean Coal Technology Demonstration Program
Status of Funding

Annual Amounts
In Millions of Dollars

Program Phase	86	87	88	89	90	91	92	TOTAL
CCT-1								
Budget Authority	99.4	148.1	149.1					397.6
CCT-2								
Budget Authority			50.0	100.0	135.0	200.0	0.0	575.0
CCT-3								
Budget Authority					575.0			575.0
CCT-4								
Budget Authority						600.0		600.0
CCT-5								
Budget Authority							600.0	600.0
TOTALS								
Budget Authority	99.4	148.1	199.1	100.0	710.0	800.0	600.0	2747.6

Figure 4

The program is basically built upon an initial $400 million that was appropriated by Congress back in 1985 and added to by the Presidential proposal in 1987 for an additional two and a half billion dollars of Federal funds over a five-year period.

Clean Coal I, CCT I as we call it here, was utilizing the $400 million that Congress first appropriated back in 1985, and we have issued that solicitation. We have made selections, and I'll talk a little about that program in just a minute.

Clean Coal 2 was the first phase of the President's Clean Coal Program. It represented $575 million of Federal funds. That program has also resulted in project selections.

What we're here to discuss today, then, is the rest of the program, Clean Coal 3, 4, and 5, and maybe beyond. Congress has already advance appropriated in Fiscal Year 1990 $575 million for us to issue a third solicitation in May of next year, and I'll talk a little more about that as well.

In addition, the President has requested additional funds of about $1.2 billion to carry out the remainder of the program in the future.

Clean Coal Technology - Round #1

Now, with respect to the Clean Coal Technology 1 Program, as Allen Wampler mentioned, that program, designed by Congress, was intended for advanced coal technologies that could be utilized for all energy markets, for all market applications, to utilize the full coal resource base, and of course to be responsive to environmental concerns (Figure 5).

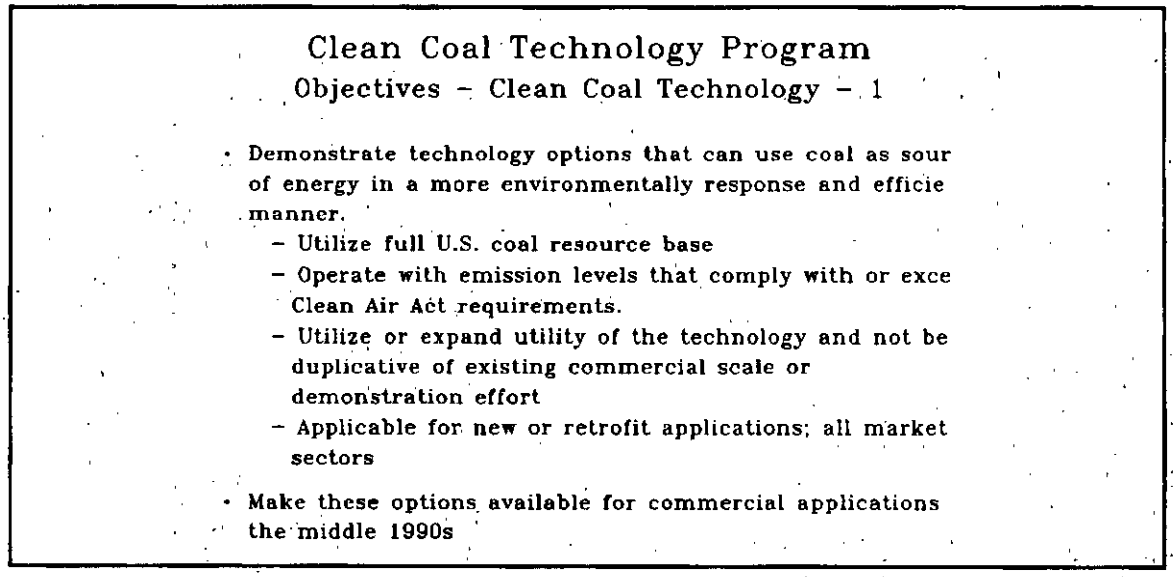

Figure 5

Now, I'm sure most of you know that this program is a cost-shared program. In fact, it's intended to be an industrial program where industry is the one that designs and carries out the projects, the Department of Energy helps reduce the risk by cost-sharing in the program.

The Federal Government, by law, can provide no more than 50 percent of the cost of these demonstration projects. That includes design, construction and testing phases.

In the first Clean Coal Program, we've selected 11 projects which represent a diversity of technologies, a diversity of applications, a diversity of coals. Nine of those projects are in various stages of development. Some are still in the design stage. Some are in the construction stage, and some are actually operating (Figure 6).

Industrial Participant	Project Location	Technology	Project Funding ($ Millions) DOE	IP	Total
American Electric Power Service Corporation	Brilliant, Ohio	Pressurized Fluidized Bed Combustion Combined Cycle Utility Retrofit	60.20	107.30	167.50
Babcock & Wilcox Co.	Lorain, Ohio	Extended Test of Limestone Injection Multistage Burner Plus Sorbent Duct Injection	7.60	11.80	19.40
Coal Tech Corp.	Williamsport, PA	Slagging Combustor and Sorbent Injection into Combustor	0.39	0.39	0.78
Energy and Environmental Research Corporation	Bartonville, Hennepin, and Springfield, IL	Gas Reburning and Sorbent Injection Retrofit into Three Utility Boilers	15.00	15.00	30.00
Energy International, Inc.	Rawlins, WY	Steeply Dipping Bed Underground Coal Gasification Integrated with Ammonia/Urea Plant	11.79	58.32	70.11

Figure 6

All of you were sent packages of information that described these projects, and for those of you who are interested, we can provide you with a lot more information on these projects. Nine projects, the ones on these charts, have been negotiated.

(Continued)

Industrial Participant	Project Location	Technology	Project Funding ($ Millions) DOE	IP	Total
The M. W. Kellogg Company	Quemahoning Industrial Park, Somerset County, PA	Fluidized Bed Gasification with Hot Gas Cleanup Integrated Combined Cycle Demonstration Plant	87.53	156.31	243.84
Ohio Ontario Clean Fuels, Inc.	Warren, Ohio	Coal-Oil Coprocessing Liquefaction	45.00	180.67	225.67
TRW, INC.	Stoney Point, NY Cleveland, OH	Advanced Slagging Combustor With NO_x and SO_x Control	23.52	25.48	49.00
Colorado - UTE Electric Association	Nucla Colorado	Circulating Fluidized Bed Combustion Technology For Utility Retrofit and Life Extension	19.92	34.17	54.09

Figure 7

We actually have contracts with these firms now, and now it's just a matter of carrying out those programs. We still are negotiating two projects (Figure 8). We hope to complete the negotiation with these two firms very quickly.

THE CLEAN COAL TECHNOLOGY DEMONSTRATION PROGRAM

PROJECTS CURRENTLY IN NEGOTIATION

Industrial Participant	Project Location	Technology
Consolidated Coal Company/Foster Wheeler Power Systems, Inc.	West Virginia	Integrated Gasification Combined Cycle Power System for Coproduction of Power and Steam
Minnesota Department of Natural Resources	Mt. Iron, Minnesota	Production of Iron through use of a New Melter/Gasifier Concept

Figure 8

A principal problem that we ran across in Clean Coal 1 was private-sector financing. Although it was made very clear in the solicitation that the Federal Government could provide only 50 percent of the cost of these projects, when push came to shove, several of the proposers found that they were having difficulty getting financing, and getting their teams together.

These two projects are still in a negotiation. For the first Clean Coal Program for the $400 million that were provided by the Federal Government, $800 million were put into the program by private industry. So CCT 1 is a $1.2 billion program, and rather than the maximum 50-percent of the cost share that the Federal Government said they would provide, actually we have only had to provide 33 percent, which is really headed in the right direction. We're glad to see that.

Clean Coal Technology - Round #2

Clean Coal 2, or the Innovative Clean Coal Technology Program, is a program that was a little more focused than Clean Coal 1.

As Mr. Wampler mentioned, this program was an outgrowth of discussion that took place between the U.S. and Canada, and a lot of the criteria for the solicitation were a direct result of those negotiations.

This program was $575 million of Federal funds, and it was, as you can see, to demonstrate advanced coal technologies that were capable in their commercial form, and I want to emphasize that again, as Allen did, in their commercial form of retrofitting or repowering existing boilers. There was no limitation on where these plants could

be located, nor was there any limitation on whether or not green fields plants could be built, or whether they would be located at existing facilities.

You can see from this slide (Figure 9) the focus of the solicitation. It was aimed at the control of sulfur dioxide and nitrogen oxides, and on the cheapest removal of those pollutants, and there was a focus, too, on technologies that, in their commercial form, would be applicable not only to existing plants, but plants that burned high-sulfur coal.

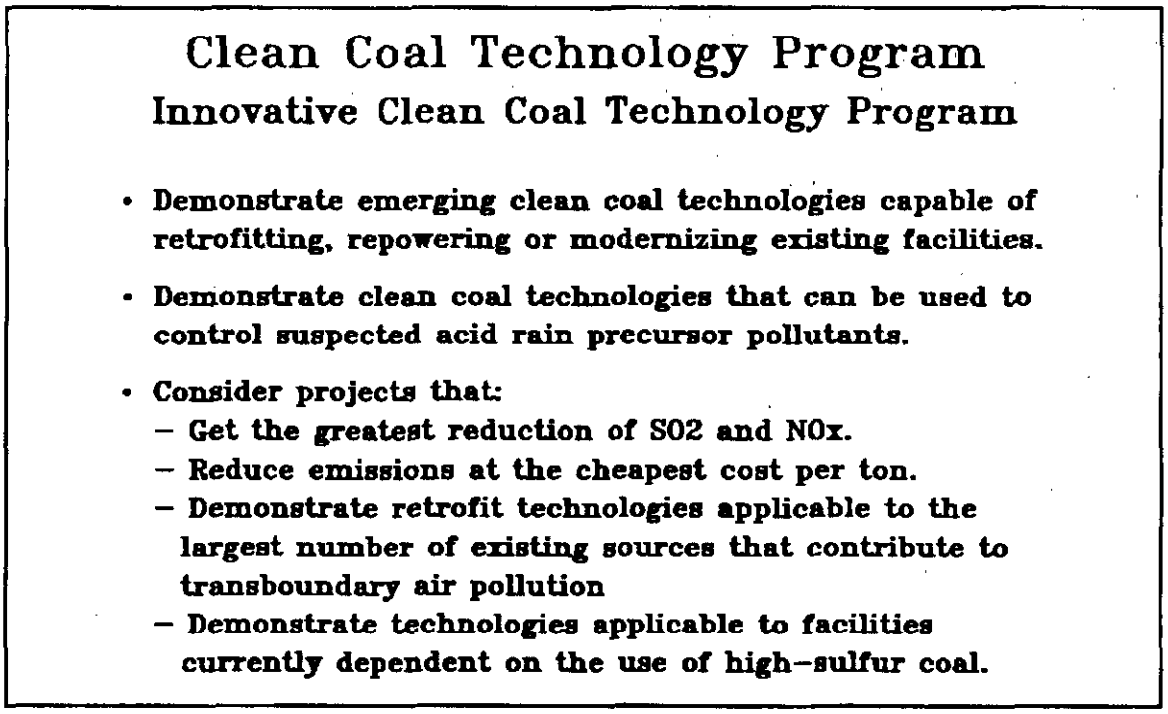

Figure 9

Now, as a result of that program we have selected about $1.3 billion-worth of projects. So again, for the 500 or so million dollars that the Federal Government put in, we got well in excess of 60 percent private sector cost-sharing in this phase of the program as well.

A variety of technologies were selected. Most of technologies for the retrofit of power plants for the control of sulfur dioxide and nitrogen oxides. Again, in your briefing materials we have some summary information on each of these 16 projects. These projects were just selected a couple of months ago, and we're right now in the negotiation process.

We hope to have negotiations completed on all of these projects within six months, and we feel pretty confident of meeting this goal because we made a number of improvements from the second solicitation from the administrative side that we think will ease the negotiation process for Clean Coal 2 (Figure 10).

CCT-2 Projects

PROPOSER	PROJECT	SITE
Southern Company Services, Inc. Birmingham, AL	Demonstration of the Chiyoda Thoroughbred-121 Flue Gas Desulfurization Process	Plant Yates Newnan near Atlanta, Georgia
Southern Company Services, Inc. Birmingham, AL	Advanced Wall-Fired Combustion Techniques for Reduction of Nitrogen Oxides	Plant Hammond Coosa near Rome, Georgia
Southern Company Services, Inc. Birmingham, AL	Selective Catalytic Reduction Technology for Control of Nitrogen Oxides	Plant Crist Pensacola Escambia County, Florida
Southern Company Services, Inc. Birmingham, AL	Advanced Tangentially-Fired Combustion Techniques for Reduction of Nitrogen Oxides	Plant Smith Lynn Haven near Panama City, Florida
Combustion Engineering, Inc. Windsor, CT	Post-Combustion Dry Sorbent Injection Technology Demonstration	Yorktown, Virginia
Combustion Engineering, Inc. Windsor, CT	Innovative Clean Coal Gasification Repowering Project	Springfield, Illinois
Combustion Engineering, Inc. & Snamprogetti USA, Inc. Windsor, CT	WSA-SNOX Technology for Catalytically Reducing Sulfur Dioxide and Nitrogen Oxides from Flue Gas	Niles, Ohio
The Babcock & Wilcox Company Alliance, OH	Demonstration of the SOX-NOX-ROX Box Post-Combustion Flue Gas Cleanup Process	Dilles Bottom, Ohio

Figure 10

Here's the remainder of the list of 16 projects that we selected (Figure 11).

CCT-2 Projects (continued)

PROPOSER	PROJECT	SITE
Southwestern Public Service Company Amarillo, TX	Circulating Fluidized Bed Repowering Project	Amarillo, Texas
Passamaquoddy Tribe Thomaston, ME	Innovative Sulfur Dioxide Scrubbing System for Coal-Burning Cement Kilns	Thomaston, Maine
American Electric Power Service Corp. Columbus, OH	Pressurized Fluidized Bed Combustion Repowering Project	New Haven, West Virginia
Bethlehem Steel Corporation Bethlehem, PA	Innovative Coke Oven Gas Cleaning	Baltimore County, Maryland
The Babcock & Wilcox Company Alliance, OH	Coal Reburning for Cyclone Boiler Nitrogen Oxide Control	Cassville, Wisconsin
Pure Air Allentown, PA	Advanced On-Site Flue Gas Desulfurization Process	Gary, Indiana
TransAlta Resources Investment Corp. Calgary, Alberta Canada	Low Nitrogen Oxide/Sulfur Dioxide Burner Retrofit for Utility Cyclone Boilers	Marion, Illinois
Otisca Industries, Ltd. Syracuse, NY	Production of Compliance OTISCA FUEL (Coal Water Slurry) and its Combustion in Retrofitted Industrial Boilers	Syracuse, New York Jamesville, New York Oneida, New York

Figure 11

I thought it would be useful to show a comparison (Figures 12-13) of the types of technologies that were selected between Clean Coal 1 and 2. It might help in some of the discussions later this morning and this afternoon.

CCT Selections by Technology

Technology	CCT-1	CCT-2	Total
Flue Gas Cleanup			14
• NOx Control	0	4	
• SOx Control	0	5	
• Combined NOx/SOx Control	2	3	
Advanced Combustors	2	0	2
Coal Preparation/CWS	0	1	1
Atmospheric Fluidized Bed Combust.	1	1	2
Pressurized Fluidized Bed Combust.	1	1	2
Integrated Gasification Combined Cycle	2	1	3
Coal Liquefaction	1	0	1

Figure 12

CCT Selections By Technology (con'd)

Technology	CCT-1	CCT-2	Total
Underground Coal Gasification	1	0	1
Iron Production	1	0	1
Total	11	16	27

Figure 13

In Clean Coal 1, out of the 11 projects we selected, only two of them were pure pollution control technologies, and they were for the combined control of sulfur and nitrogen oxides. As you can see, in Clean Coal 2, 12 of the projects selected are pollution control technologies that would either control nitrogen dioxide, sulfur, or the combination of two pollutants. You can also see in the middle, integrated gasification combined cycle, and atmospheric and pressurized fluidized bed combustion. Those technologies can be used to repower, or can be used in grass roots applications for new power generation.

You see no advanced combustion, no coal liquefaction, no underground coal gasification, or other types of projects selected under Clean Coal 2, so the criteria clearly had some influence on the types of projects that were selected in Clean Coal 2.

Clean Coal Technology - Round #3

Our plans for Clean Coal 3 will be guided by some guidance we received from Congress, and I should point out. Congress did advance appropriate $575 million. Again, the Federal Government can't put up any more than 50 percent. Congress did tell us that the solicitation was for technologies that, again, in their commercial form could be used to retrofit or repower existing facilities. Congress told us to use the same guidance they gave us both for Clean Coal 1 and for Clean Coal 2, so there's some judgment involved as to how to implement the program, and of course, we're looking for any advice you have.

I should point out that for CCT 3 Rural Electric Administration and Tennessee Valley Authority funds are eligible as cost-sharing. Now, previously Tennessee Valley Authority, who wanted to participate in the program, was told that all funds that the Tennessee Valley Authority had were considered Federally appropriated funds and therefore could not be counted as their 50-percent share.

As a result, there was a real limitation of TVA's involvement in the program. The same thing held true with rural electrics, who received funding from Rural Electric Adminstration.

Congress cleared this up for this solicitation. Congress also told us, if you skip down now to the schedule, that we were to issue the solicitation by May 1 of next year; that you would have 120 days to submit proposals, and we would have 120 days after that to make the selections, or by the end of December of next year (Figure 14). Our plans for the program, again just skipping down to the bottom, of course we're going to comply with the Congressional guidance.

CCT-3 Congressional Guidance

- **$575 Million**
- **For Retrofit and Repowering**
- **Subject to Same Provisions as CCT - 1 & 2, Except REA and TVA Funds Eligible as Cost Sharing**
- **Schedule**
  - **May 1, 1989 - Issue Solicitation**
  - **120 Days to Propose**
  - **120 Days to Select**

Figure 14

We intend, though, to have a series of public meetings, this being the first, to get the public's input on the solicitation process, and to learn more from you as to how we can improve the programs, not only to be responsive to the Western concerns that I'm sure all of you have, but also procedural things that exist within the solicitation (Figure 15).

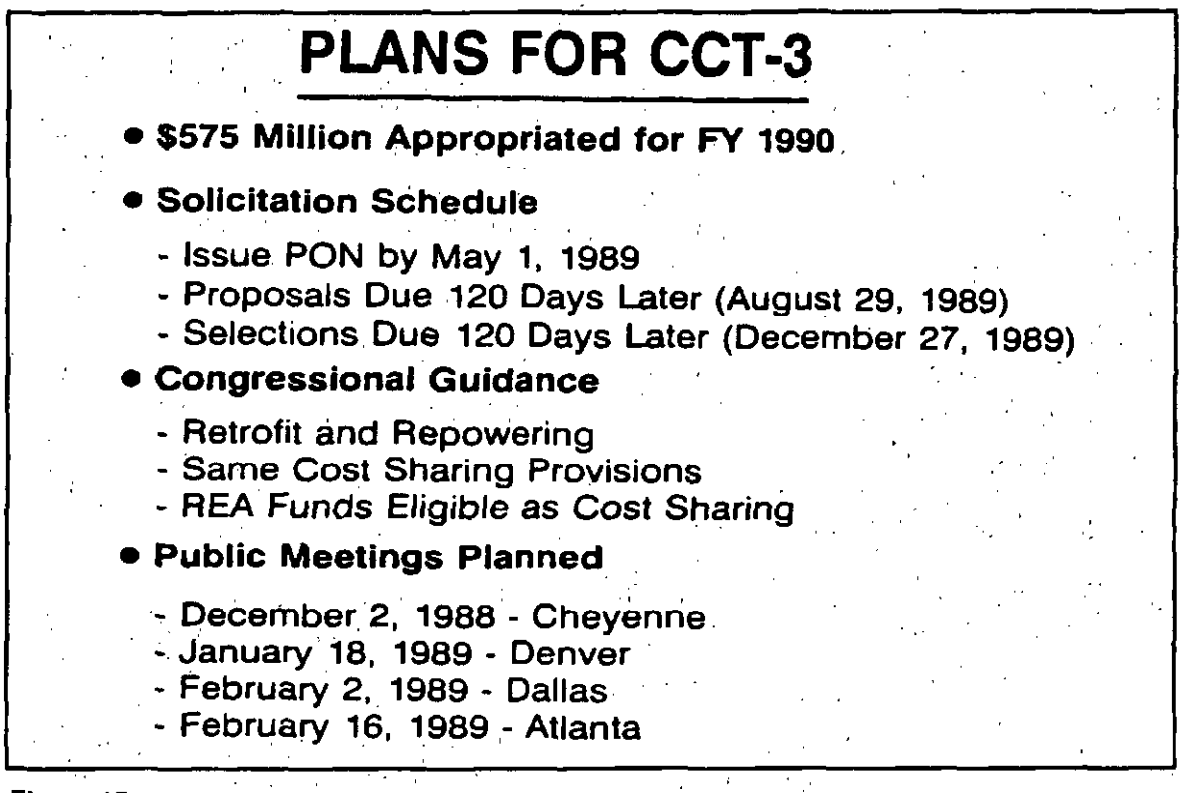

Figure 15

We're adding something new to our public meetings after this Cheyenne meeting, and that is we're going to have a session devoted to the Department of Energy's procurement process where those of you who have not dealt with the Department of Energy before can learn more about it and ask questions about our procurement process. As you can see, the meetings are scheduled for the dates shown. There will be a *Federal Register* notice issued within the next few weeks providing all of the information on the meetings. We'll be sending out to those on our mailing list, which will include all of you now, copies of that *Federal Register* notice.

Now, one last thing I would like to go through before I move on, and as Allen mentioned, it's you we want to hear from, and I'm sure you don't want to hear too much from us, but I thought it would be of value to walk through some of the differences between the evaluation criteria that were used for Clean Coal 1 and Clean Coal 2. It might provide some more information to be used in the breakout sessions.

Both CCT 1 and 2 were divided into several sections. Qualifications criteria were criteria (Figure 16), in most part responsive to Congressional requirements, that had

to be met in your proposal. If you failed to meet one or more of these, your proposal was automatically eliminated from consideration in the program.

CCT Evaluation Criteria

Criterion	CCT-1	CCT-2	Comments
• Qualification			
-Project Located in U.S.	X	X	Congressional Requirement
-U.S. Coal for Project	X	X	Congressional Requirement
-Minimum 50% Industrial Cost Share	X	X	Congressional Requirement
-Site Availability	X	X	
-Compliance With CAA	X		
-Project Team Commitment	X	X	
-Repayment		X	Congressional Requirement

Figure 16

I don't think there's much point in discussing these. They're very straightforward, and so I'll just pass on to the next. If your proposal made it through qualification round, then it was evaluated in detail by our source evaluation board. The proposals were divided into several pieces, the first piece being the technical piece (Figure 17). The technical piece was divided into two sections, one that looked at the technology in its commercial form, and that's the criteria that are shown here.

Criterion	CCT-1	CCT-2	Comments
• Technical			
- Commercialized Technology			
-- Environment, Health, Safety			
• Ability To Meet or Exceed Requirements	X		
• Amount of SO_x / NO_x Emissions and Transboundary Reduction		X	Lewis-Davis
-- Marketability - Expand Utilization of U.S. Coals	X		
-- Cost-Effectiveness of Controlling SO_x / NO_x		X	Lewis-Davis
-- Commercialization Plan	X	X[(a)]	(a) B&M Criterion

Figure 17

I should point out that there is a significant difference between the criteria that were used in Clean Coal 1 and 2 in this area, in the commercialized technology area, and you'll see there's a heavy influence from the Lewis-Davis recommendations.

The next element of the technical evaluation dealt with the demonstration plant itself; what were the environmental implications at the site and what work was going to be done at the demonstration site (Figure 18).

CCT Evaluation Criteria (cont)

Criterion	CCT-1	CCT-2	Comments
• Technical (cont)			
• Demo Project Factors			
-- Technical Readiness	X	X	
-- Adequacy and Appropriateness	X	X	
-- Environment, Health, Safety			
• Compliance With All Reqts; Adequacy of Site	X	X	
• Degree to Which SO_2 and NO_x Emissions Reduced		X	
-Technical Approach/Statement of Work	X	X	

Figure 18

There is one major difference between Clean Coal 1 and 2 in this regard, and that deals with the amount of sulfur and nitrogen oxides that would be reduced, and that was a distinct criterion in Clean Coal 2 that was not in 1. There was also a business and management part of each proposal that was submitted that dealt with the financing of the project, the team that had to be put together to carry out the projects, and a few other things (Figure 19).

CCT Evaluation Criteria (cont)

Criterion	CCT-1	CCT-2	Comments
• Business and Management			
-Priority Top Management Places on Project	X	X	
-Financial Condition/Capability To Finance	X	X	
-Financing Plan	X	X	
-Key Personnel/Experience	X	X	
-Management Plan	X		
• Cost			
-Appropriateness and Reasonableness	X	X	

Figure 19

Really no major differences between Clean Coal 1 and Clean Coal 2 there, except that in Clean Coal 2, financing, the extent to which you had gotten commitments on financing was much more important in Clean Coal 2 than it was in Clean Coal 1.

We wanted a little better feel, and in fact we got a lot of comments from the public in the public meetings we had last year on this program, that it would be best to give more emphasis on the financing. Finally there was a cost evaluation conducted. The cost criteria dealt with how much the project would cost totally, and what was it going to cost the Department of Energy.

There were also factors called "program policy factors." (Figure 20) These factors enabled us to meet the goals and objectives of the program, but these factors were beyond your control.

Criterion	CCT-1	CCT-2	Comments
• Program Policy Factors			
-Diversity of Methods, Technical Approaches, Applications	X	X	CCT-2 Limited to Retrofit and Repowering Existing Coal-Fired Facilities
-Broad Cross Section of U.S. Coal Resource Base Now and in Future	X		Not Stand-Alone in CCT-2
-Variety of Facility Types and Sizes and Coal Types for Use on Existing Facilities		X	
-Group of Projects Balancing Expanded Coal Use and Environmental Protection	X		
-Collective Near-Term Reduction of Transboundary Transport of SO_x and NO_x		X	Lewis-Davis
• Other Considerations			
-Preference to Projects in States Which Give CCT's Incentives Like Pollution Control Devices		X	V.P.'s Task Force

Figure 20

Congress told us, and the Lewis-Davis criteria told us that we should select a diversity of technologies so one program policy factor dealt with selection of a diversity of technologies. In addition, there are several others that are here.

I should point out that the big difference between Clean Coal 1 and Clean Coal 2 is that it's the very last tick under the first bullet, that there should be some collective near-term reduction of transboundary air pollution of sulfur dioxide and nitrogen oxide from the projects selected.

Well, that this brings you up to date on the program. Now I'd like to get into the issue at hand.

Our first speaker this morning is Randy Wood. Randy is the Director of the Wyoming Department of Environmental Quality. Randy also is a member of the Department of Energy's Advisory Committee to Clean Coal Technology Program, and in fact has been quite influential in helping us guide that program. As I mentioned earlier, he will be discussing this program from a Western state perspective.

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Remarks by Randolph Wood

S T A T E M E N T

December 2, 1988
By Randolph Wood

DEPARTMENT OF ENERGY PUBLIC MEETING

This statement is presented on behalf of the Honorable Mike Sullivan, Governor of the State of Wyoming.

The Department of Energy's initiative in seeking information on how to increase Western participation in the Clean Coal Technology Program is both admirable and encouraging.

However, this initiative cannot be an "empty process" designed or functioning to simply publicly hear the concerns of Western states and Western interests. Based upon the history of the Clean Coal Technology Awards, it is clear that the past process has been a technology development subsidy for Eastern high sulfur coal states or interests.

If a Clean Coal Technology Development Program is truly to be a national effort (and the public has been assured that this is the case), bias against Western coal which has been evident in the past awards must be eliminated.

While the West is not naive enough to believe that all interests are always treated equally, we do firmly believe in the doctrine of equality. We firmly believe that this doctrine has been violated in the Clean Coal Technology Awards Process to date.

The Innovative Coal Technology Advisory Panel recommended to Secretary of Energy Herrington a set of criteria for evaluation of projects which was a fair and delicate balance of all interests - both national and international, East and the West, consumers and producers, emitters and receivers. This proposed criteria was reflected in the subsequent Program Opportunity Notice for Clean

Coal too, implying that it was a fair balance in the view of the Secretary of Energy.

However, something appears to have happened between the design of the product and the actual manufacture of the product. I say "appears to have happened" because we only have the final results and have been denied access to the actual evaluations. It is apparent to me that the criteria which was to be used in the evaluation process was either discarded or modified.

Because of the tremendous importance to the State of Wyoming of the Clean Coal Technology Program, I attended a debriefing conducted by the Department of Energy for an unsuccessful Western proposal with optimism that the debriefing would pinpoint deficiencies in the proposals and thus offer opportunities for improved proposals in the future. Being an optimist, it was my belief that we should learn from our past in order to improve in the future.

I was extremely disappointed during that debriefing exercise. What I saw was a bureaucratic process designed to deny revelation of any meaningful data or information which could be useful to me or the proposer. The process was artfully crafted to assure that no one could cry foul.

However, one thing that was extremely disturbing was that the Department of Energy Debriefing Board clearly stated that a proposal which would produce an enhanced low sulfur Western coal would not receive high marks if it would displace high sulfur Eastern coal since credit would not be given for emissions reduction produced by fuel switching to this enhanced low sulfur Western coal. The Board based this determination on a provision in the Lewis-Davis Accord, which was designed to minimize social disruption in Eastern coal producing regions.

This issue was discussed extensively in the Innovative Coal Technology Advisory Panel but the final recommendation to Secretary Herrington clearly did not advocate such a bias against low sulfur Western Coal projects. Additionally, the evaluation criteria and program policy factors contained in Section 5 of the Program Opportunity Notice are devoid of such a bias.

The Program Opportunity Notice sets forth fairly clear criteria and program policy factors against which the proposals were to be evaluated, but it is apparent that the evaluation team incorporated an additional economic disruption disqualification criteria which made it impossible for Western projects to succeed.

Therefore, in answer to your question on how to encourage Western projects, my major proposal to you is to eliminate the bias against Western projects based on Eastern social and economic issues and therefore level the playing field. So long as even the perception of such a bias exists, Western interest will be discouraged implicitly, if not explicitly.

Through the work groups which will labor the rest of the day, I am confident that other suggestions will be put forth but these will all be in vain if this one major obstacle is not first torn down.

Once again, we here in the West, sincerely appreciate your expressed desire to encourage Western participation in this very important process and we would be pleased to answer any questions which you might have.

Thank you.

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Remarks by David R. Williams, Jr.

REMARKS BY DAVID R. WILLIAMS
CLEAN COAL TECHNOLOGY (CCT) - PROGRAM REVIEW
DEPARTMENT OF ENERGY
CHEYENNE, WYOMING
LITTLE AMERICA HOTEL
DECEMBER 2, 1988

LADIES AND GENTLEMEN:

It is an honor to join Secretary Wampler in urging the western sector of the U.S. Coal Industry to respond with questions, criticisms, and suggestions in regard to DOE's plans for the forthcoming the Third Round $575 million Clean Coal Technology solicitations for proposals, expected to be released about May 1st of next year. With hands-on management experience in the coal industry, in addition to his academic credentials, Secretary Wampler brings a depth of knowledge of our industry that is unique in government, and we are all fortunate that he and his capable organization are handling Fossil Fuels in Washington.

The DOE-CCT program has been mandated and its guidelines prescribed by Congress. Secretary Wampler's effort to make this program more interactive between DOE and the coal industry is to be commended. Accordingly, this conference offers an unusual opportunity to suggest modifications in the program to accommodate western coal's needs.

WYOMING - COAL STATE

It is very fitting that this review conference is being held here in beautiful Wyoming, a state with more energy reserves than Saudi Arabia, mainly due to the enormous low cost, low sulfur, Powder River Basin Coal deposits, about 60% of which lies in Wyoming, and the rest in its neighboring state to the north, Montana. This largest single body of energy in the world is today, and may remain for centuries, the lowest cost energy on a BTU basis at the source.

Only 15 years ago, Wyoming's annual production of coal was little more than 10 million tons per year. Recently it reached a peak of 147 million tons, but this rapid growth has come to a halt; just when the invasion of coal markets by nuclear power and cheap oil have virtually ended. In addition, the Alternative Fuels Act of 1978 was supposed to give coal a break and reduce oil imports. (One can expect the new administration to advocate more use of gas in power plants to reduce emissions).

Certainly one of the reasons that the radius of market penetration by this highly desirable low sulfur coal is no longer expanding is the limitation of rail transportation costs. Adding to this high inland cost is the fact that PRB coal presently must be shipped with its innate 30 to 35% moisture content. Railroads charge just as much for hauling water as they do for hauling coal. Technologies to allow this coal to be dried must overcome its tendency to readsorb moisture and to spontaneous combustion after drying, and they need urgent attention now. While new drying methods may extend PRB's market radius, there would still remain a rail transport cost too high to allow PRB coal

to reach Pacific or Gulf Coast ports at a competitive cost to compete in overseas markets. The 70 million tons per year of idle mining capability already in place in Wyoming alone, suggests further improvements in slurry pipeline technologies be expedited to greatly reduce this inland transportation penalty to an energy resource of ultimate world strategic importance. We understand Amax has developed a drying process that solves the hydrophilic and pyrophoric problems of PRB coal, and this is an example of what needs to be done.

THE WESTERN VIEWPOINT

Most Westerners have viewed the clean coal technology program as having been diverted by the Congress, from its original broader purposes, to a concentration solely upon solving the Acid Rain problem for eastern utilities that lie in a belt from the Mississippi River through to the Mid-Atlantic coast. As a result, many of the proposals involve eastern utilities, often in combination with engineering firms and manufacturers. There also is a considerable duplication, which means that competing processes for the same purpose will develop in parallel, and must ultimately compete. There seems to be few new technologies, and some of the technologies are repeaters, having been supported by the DOE and state agencies in prior programs. While the Acid Rain problem needs urgent attention and government support, it is not the only problem in an American coal industry that is losing its competitiveness and ability to participate in what may be the beginnings of a technology driven world coal trading infrastucture. While solving the problem of Acid Rain for Canadians and New Englanders is an urgent and valid objective, it does not fulfill the entire range of needs of our nation's coal industry, nor does it seem likely to improve the technology that will be necessary if our somewhat dormant coal industry is moved into the future world of international trading and competitiveness, as well as better serving more U.S. markets and backing out imported oil.

Westerners note that, even with most coal companies headquartered east of the Mississippi, there is a notable absence of coal producers as sponsors of the CCT projects, or for that matter, new technologies in general. The fact is that our coal industry is just not moving ahead on new technology.

Therefore, it appears to Westerners that the DOE-CCT program is tailored to eastern coal and to the problems of eastern utilities, many of whose plants are smaller and older than those in the west. We have our own equivalent to the Acid Rain situation in the east, and that is finding ways to burn coal in the Pacific coast states, particularly California. At present, it will be some time before combinations of fluid bed and scrubber technologies will allow the burning of coal in these populated west coast states. Over 70% of the population of the states west of the Mississippi lies in these west coast states and Texas; since Texas burns mostly gas, the largest potential markets for western coal producers is presently out of reach. Some western coal does reach northern Texas, and some reaches Mississippi Valley and the Great Lakes area, where its low sulfur content makes it suitable for blending with the higher sulfur eastern coals. Again, this is limited by rail rates.

Westerners note that the DOE-CCT Round One and Round Two Projects are mostly old technologies and highly concentrated on combustion and flue gas treatment, with very little emphasis upon pretreatment. Westerners view their problems as quite different from those upon which the CCT program has

concentrated so far. Western coal is different, with higher moisture and lower sulfur, and will require different solutions; most of which will have to come from newer technologies that are not yet sufficiently mature to qualify for the CCT requirements of immediate availability for powering and retrofitting. These are the reasons why only one western project out of 17 were selected in Round Two of CCT. We are grateful to Secretary Wampler and his excellent team, for turning their attention to the special problems of western coal.

Accordingly, we Westerners would like to see a return to some of the original concepts for the DOE-CCT program. We would like to see the program return to technologies that will make the American coal industry more competitive, in the interest of national energy security. This will not only back out increasing imports of foreign fuel oil, but also will achieve a logical share of export markets, particularly in the Pacific. We would like to see more emphasis upon newer technology that may require relaxing the strict requirements on maturity. We would like to see an emphasis upon pretreatment equal to that of combustion and after-treatment. We also believe there is too much duplication, and that some of the new technologies now emerging, not only would have better solutions for western coals, but would have less duplication.

COAL SLURRY TECHNOLOGY

One of the penalties of western coal is its great distance from markets. There is more interest in the west to see coal slurry pipeline transportation come into its own, to solve the disadvantage of western coal's high inland transportation costs. It should take its place as part of the logistic solution and the total balance between pretreatment, combustion, and after combustion cleanup.

We operate the Black Mesa Pipeline that delivers 5 million tons per year of high quality Arizona coal to a power plant in Nevada. We have been involved in coal slurry pipelines since building the first one in Ohio in 1956, and have maintained slurry test loops in Tulsa ever since. We are now investigating a lower velocity, laminar flow, higher density slurry that will employ some newer coal-water-mixture techniques, to transport coal slurries that can be directly fired into boilers. This will greatly reduce the water supply problem at the origin, and the water cleanup problem at the destination. This could also enhance work on fluid bed combustion, and improve materials handling of coal in a fluid mode. It could also facilitate western coal reaching its logical markets on the west coal and in the export to the Pacific, now virtually denied. It could also facilitate new technologies of pretreatment that can be done at the mine more cheaply than at the destination.

EXPORT POTENTIAL

As Westerners, we note U.S. exports of metallurgical coal have dropped somewhat; however, U.S. exports of steam coal have dropped dramatically in the last 5 years. This has happened in spite of in the face of almost 5% annual compounded growth in foreign markets, and the fact that the drop in the dollar has made American coal less expensive to many foreign markets. Most of U.S. steam coal exports are from a half dozen ports in Chesapeake Bay, and we Westerners have long pondered why almost no American coal is exported to the markets that have the largest demand growth and where most of the U.S. balance of trade deficits lie - the Pacific. While this is not directly a clean coal problem, it seems to us that solving the problem of burning coal in the west

coast, particularly California, would also help solve this export logjam. As we all know, it is still next to impossible to burn coal in California power plants under the Air Resources Quality Act of 1974. DOE is to be commended for the Cool Water Project that may provide one of the answers. Certainly other answers are needed, and some must be in the manner of preparation of coal at the origin, which also may be compatible with the new slurry pipeline technique of pumping a direct fired coal-water mixture.

PRETREATING

While we are here to examine why there are not more western coal technology projects under the DOE-CCT program, we Westerners have noted in the past is that most of the emphasis to date in CCT has been given to forms of combustion technologies, and to flue gas treatment processes; with little to pretreating or preparation of the coal feed to power plants.

For many years I was involved with a company that had a flue gas treatment division, as well as a boiler fabricator and installation division. Combining this with our coal slurry pipeline background, we have found that coal preparation and transportation are integral parts of the design of the boiler and the flue gas treatment, in that every step in this logistic chain affects the other. For example, it is likely that pretreatment at the mine will more than pay for itself in transportation, combustion, and scrubber benefits.

ACID RAIN NOT JUST AN EASTERN PROBLEM

Most of us Westerners think of Acid Rain as an eastern problem, and yet we often overlook that our highly populated west coast states have some of the worst air quality problems, even with the most stringent air quality regulations, and that this causes our west coast to join with Florida and New England as the three largest regions of imported foreign fuel oil. For coal to take its rightful place in the west coast U.S., some new technologies will be definitely required. While the CCT program can provide significant comfort to Canada and New England in doing something about Acid Rain, we would also like this work to result in ways for western coal to back out foreign oils in our important west coast markets as well. We have the feeling it would also help achieve export markets in the Pacific as well.

WESTERN SOLUTIONS - NEW TECHNOLOGY

Another aspect of the CCT program is the concentration upon mature technologies that can be immediately retrofitted. This means that only the older technologies, most of which have been based upon eastern coal, continue to be recipients of matching funds under the CCT program. These older technologies obviously have merit, but it will take newer technologies to solve the problems in the west.

Also western coal producers are mindful that air quality regulations, requiring 90% of impurities to be removed from stack gases, discriminate against pretreatment (and also against western coals with much lower sulfur content). We are also aware that most of the fluid bed and coal liquefaction projects supported by DOE are based upon eastern coals. An example is the SRC-2 coal liquefaction process, while making significant progress in recent years,

nevertheless, is a solution for eastern coals and not practical for the lower rank western coals.

We would like to see more work sponsored and assisted by DOE in the liquefaction of the less mature, more chemically reactive western coals. In our company's coal chemistry work, it appears quite likely that both western sub-bituminous and lignites could yield a higher slate of liquefaction products than the higher rank eastern coals, and at the same time, have a greatly lower feed stock cost. This is an area that urgently needs further work.

Therefore, it is fair to say that Westerners would put more emphasis in the CCT program on newer technologies rather than old; not only that the next solicitations do not only put money back into the same old technologies, but since newer technologies are emerging that are more likely to solve the western problems. Hopefully, DOE may be able to persuade the Congress to add new provisions for CCT to include new technologies.

EVALUATION

Newer, less mature technologies are harder to evaluate, and we would propose a function of DOE might be to evaluate technologies that are not yet commercial. This is not suggesting that DOE get involved with research programs, or support purely conceptual ideas, but that those valid research programs, demonstrated by good results in pilot plant testing, but not yet immediately ready for retrofit, should be investigated and supported. Not only does DOE have the competency to evaluate these less mature technologies, but it already is monitoring and evaluating emerging technologies of special promise.

SPECIAL INITIATIVES

Secretary Wampler's Fossil Fuels group is working on a number of initiatives beyond CCT, that could lead to other innovative industry-government cooperation of the kind so effective in Japan and other foreign countries. In fact, it exerts a kind of leadership that is prodding industry to respond. Normally, private industry is out ahead of government with its own initiatives, but in this case, the American coal industry is not as technology driven as the American oil industry, the world's leader, responsible for discovering most of the major basins and for establishing much of the basic worldwide infrastructure.

These initiatives beyond the Congress mandated programs, fulfill a crucial role in a void of industry initiatives. They include the Initiatives for Coal Export, and the U.S. Fossil Fuels Technology for Developing Countries, Pacific Basin Coal Trade Issues, and others. Of particular interest to us Westerners is the DOE's evaluation of Pacific coal trade issues. An extensive data base has been prepared with the software to evaluate markets, trends, economics, logistics, and comparative competitive sources. Thus, the DOE is taking a lead in addressing the question of why American coal does not sell in Asia, which must be supported by a comparable effort on the part of the coal industry.

FUTURE WORLD TRADE IN COAL

Hopefully, these initiatives by DOE will stimulate the U.S. coal industry, venture capital, and technology services into more long range strategic planning

to define the facilities, technologies, and commitments that will be needed for the U.S. to participate in the coming era of worldwide marketing of fungible coal.
Otherwise, foreigners will provide this service for us, and they may even become a factor in our domestic mining someday. It could be the start of a technology driven, worldwide coal trading network. Someday coal may go through a similar refining step that oil does today, which will then result in fungible products that can be sold in world markets, and distributed like petroleum products.

COAL MUST BRIDGE THE GAP

While cogitating upon what the Clean Coal Technology Program should be, or how Congress might alter its strict guidelines, we must keep in mind that in the long range, coal must replace a large amount of the functions now served by oil. In fact, oil production in the world is near its peak, and should decline in the next 40 years to somewhat like half its present world production. While there are many other more renewable technologies of the long range future, certainly coal must fulfill a major part of the declining availability of oil.

COAL AS TURBINE FUEL

While invasion of coal's dominant use in electric power generation by oil and nuclear has diminished, one area where coal could lose market is the increasing use of combustion turbines. With waste heat recovery, these turbines may equal or exceed steam boiler efficiency, and they offer greater flexibility.

From the many utility clients of our former engineering subsidiary, we have indications of a trend toward "base-loading" combustion turbine/generators, rather than committing to large thousand megawatt boilers. First of all, commitments in smaller increments can be a more flexible response to varying and uncertain demand growth. Also, with skid mounted units and few siting or environmental problems, installation can be done in a small fraction of time for the larger boilers. With waste heat recovery, these combustion turbines can equal boiler efficiency and at the same time, need far less capital costs for the same output. Therefore, we see an increasing trend towards having modules of combustion turbines, in increments, rather than the commitment for the large boiler that won't come on stream for 7 or 8 years after commitment, with an uncertain cost and load demand at the time of completion. Combustion turbines, so far used mostly for peak shaving will increasingly be base loaded.

This says to us, not only that combustion turbines will take an increasing share of the new generating growth in electric power, but also that coal can maintain its position in power generation by finding clean fuels for these turbines. We think this is an important target for coal-water mixture, and for solvent refined coal processes. This should be especially true on the west coast, and of particular interest to the western coal industry.

ENTREPRENEURIAL, TECHNOLOGY AND TRADING SKILLS NEEDED

In the coal industry, we are lucky to have such knowledgeable people at DOE in Fossil Fuels, and the initiatives taken that the industry normally would be providing; and thank heavens they are! The American coal industry is highly

fragmented, has little research, and little interest in downstream facilities. Most coal company executives will frankly admit that they would like to load rail

cars and not worry about what happens to the coal after the train leaves the siding. Should the day come when coal derived products are processed, shipped, and distributed much as petroleum products are today, these short range policies will leave the U.S. coal industry virtually out of a worldwide technology driven infrastructure set up and dominated by others.

U.S. coal companies, with some notable exceptions, are accustomed to standard contracts with their utility customers that are almost risk free in providing a steady market. While having marketing skills, most of these companies do not have oil industry type trading skills or international relationships. In fact, trading is an art developed by international oil companies and the large trading companies in the Orient. Building better ports, slurry pipelines, more fungible products, and other logistic facilities is a huge leap for the risk-averse U.S. coal industry today.

U.S. LONG TERM ADVANTAGE

In spite of this short range orientation, the U.S. coal industry in the long term may have a great advantage in economics of scale, and could be one of the largest suppliers to foreign markets. The present inertia in the U.S. coal industry, especially serious at this time of soft energy prices, will be a serious problem for our country in its rightful trading position in one of its largest trading commodities. To do this, the U.S. coal industry must first learn ways to serve all if its logical markets in the U.S.

Therefore, we should commend the DOE for its foresight and initiatives, and also for seeking the industry's advice and participation. I urge you to support them vigorously to become a full partner in this emerging industry-government cooperation, to make it a two-way street.

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Remarks by Gary D. McDowell

Remarks by
Gary D. McDowell
Vice President Western Operations
AMAX Coal Company

As Jack said, my name is Gary McDowell. I'm Vice President for Western Operations for Amax Coal, and I'm headquartered in Gillette, Wyoming, Amax Coal is a subsidiary of Amax Coal Industries. We are pleased to be here today to present the views of a mining company to DOE.

As I understand it, the purpose of this meeting is to seek out ways in which we might increase the number of Western projects proposed for Clean Coal Technology demonstration funding. I don't pretend to have all the answers, but perhaps I can point to a few things that might improve the process and help in some small way to increase the number of Western projects proposed for the next Clean Coal Solicitation. I do not represent my views to be the views of the entire Western coal industry. However, I feel that the concerns of my company will parallel those of other Western producers.

Much of what I have to say here today is probably familiar to most of you, and perhaps even touches on what was said earlier, so I hope that you'll bear with me, but for a moment let me tell you a little about our company.

Amax, Inc., the parent company of Amax Coal Industries, is a world-wide supplier of metals, as well as distributor of value-added metals. The company's principal businesses ar aluminum, gold, molybdenum, and coal. Alumax, Inc., a wholly-owned subsidiary, is the third largest integrated aluminum company in the United States.

Amax Coal Institute is the nation's third largest coal producer, producing around 36 to 40 million tons a year.

Amax Gold is the twenty-sixth largest gold producer in the U.S. and is expanding. Amax also has significant investment through Amax Metals Company, and a growing natural gas production distribution business.

Amax's primary production facilities are located in the United States, but it supplies and sells throughout the world.

Amax entered the coal business in 1969 with the purchase of the Ayshire Collieries, a modest Midwest coal producer. In the portfolio of undeveloped reserves controlled by Ayrshire there was a block of Federal coal located in the Powder River Basin of Wyoming. Quite frankly, in those early years the individuals in the home office in Indianapolis didn't think much of that coal deposit, but in a few years a handful of visionary men and women decided to take a chance and gamble some of the money to develop the coal in the Powder River Basin, and if you go back and read that justification, it was

called an "experiment," an experiment to see if coal in the region could be produced and marketed profitably.

At that time there was only one small mine-mouth operation producing coal in the Powder River Basin. In fact, the entire State of Wyoming production was only 11 million tons in 1972. In 1973 Amax opened the Belle Ayr Mine and provided low-cost, low-sulfur subbituminous coal.

Amax put a lot of time and effort into selling this coal to skeptical utilities, equipment manufacturers, and even railroads, and I think that's an understatement. I can remember when we talked to vendors. They laughed at us, and then the called General Motors and told them, and they laughed at us, but we all sat down and talked about it, and the response was overwhelming, and we soon were expanding the operation. Others would soon join us: Exxon, Arco, Shell, Sun, Mobil, and others, in developing large-scale mining operations in the Powder River Basin.

Well, what produced that phenomenal growth? What was the attraction to this little-known coal basin? Quite simply it was clean coal. Clean coal, low-sulfur coal, lowash coal, not only here in Wyoming in the Powder River Basin, but throughout the West. Clean coal, low-sulfur coal to meet the requirements of the Clean Air Act of 1970.

A second reason that Western coal grew can be attributed to the energy crisis in 1973 and 1974, when this nation turned increasingly to coal to fulfil its energy needs and bolster our energy security.

Energy security and environmental responsibility are two touchstones of this nation's energy priorities and policies. And coal in the East and in the West had, has played a leading role. I'd first like to talk to the topics of energy security.

Coal is the largest energy resource in the United States. There are presently 480 billion tons in proven reserves in the U.S. This is equivalent to 1.8 trillion barrels of oil, and enough coal to last for hundreds of years at current production rates. Two hundred sixty billion tons of that reserve are located west of the Mississippi, and right here in the State of Wyoming we have a large reserve base waiting for future development and production.

For most of its history the U.S. has depended on coal. At one point every major economic sector used coal: Transportation. Ships and trains were coal-fired. The residential and commercial sectors used coal for cooking and heating. Coal fired most of the industrial processes. Coal was used to manufacture gas, and coal was used as a feedstock in most chemical processes. And, of course, electrical power was produced from coal.

Over the years coal has been displaced in some markets. For example, transportation. Residential/commercial use has declined. In industrial applications coal use

has also dwindled from its historic highs where once coal accounted for perhaps 75 percent of the nation's energy.

Today coal accounts for only 26 percent. Now, oil and natural gas account for 74 percent, but look at the reserve base. What is the future availability of fuels that will be necessary to insure our economic growth. Ninetyfour percent of that energy reserve base is coal. Only six percent is oil and gas.

In 1988 this country will consume 869 million tons of coal, and export another 89 million tons. Nine hundred fifty-eight million tons. Three hundred sixty-one million tons, or 38 percent, is produced west of the Mississippi, and 157 million right here in Wyoming.

Eighty percent of domestic coal consumption is used to generate electric power, and 57 percent of all electricity generated in this country is coal-based. The remaining 20 percent of domestic coal is a split between industrial applications and metallurgical coal for the nation's steel industry.

Coal utilization had increased, up to 200 million tons in the past ten years. At the same time we have reduced emissions. Total SO_2 emissions have declined by nine million tons since their peak in 1973.

Environmental responsibility has been an integral part of increased coal utilization. As we look to the future, coal use will increase, reaching in excess of one billion tons before the turn of the century. However, coal use cannot expand unless environmental issues associated with coal combustion are addressed.

The Western coal market was developed, in part, because of the national commitment to reduce emissions of SO_2. The West will continue to have a major part to play in both the energy security of this country and the work to insure a cleaner environment. Research and development, new innovative means to use new coal in a clean, safe, environmentally acceptable manner, is a national priority.

We in the West want to expand Western coal's role and find ways to use more coal. Just as Amax Coal took a chance in the early 1970s and did some experimenting, so too others must take the opportunity to reach out.

Once again Amax is taking a leading role at our Bel Ayr Mine. Amax Coal is putting the finishing touches on the first of its kind fluidized bed coal drier. This drying will upgrade the subbituminous coal from 8,400 BTUs to a product with 10,900 BTUs. This greatly expands the market potential of the Powder River Basin' inherently low-cost, low-sulfur coal.

More can and must be done in the West, and we need the support of the Clean Coal Technology Program. We in the coal industry know that there is strong support, and a commitment to coal use on the part of the Department of Energy and the Office

of Fossil Energy. DOE has been working hard to support coal and coal-based programs.

The Morgantown Energy Technology Center and the Pittsburgh Energy Technology Center are well known for the research they've conducted. Clean Coal I and Clean Coal II offer financial support for new clean coal technology, for work in coal preparation, conversion, combustion, and energy conversion processes, coal products, flue gas desulfurization, cleanup, and a host of other efforts.

The question before us here today, however, is not the degree of the DOE support for coal, but a simple question: Why, after two rounds of solicitation, have so few Western projects been proposed and selected?

To get a handle on that question, I'd like to briefly review two items. The first is the Annual Report to Congress, which outlines objectives of the Clean Coal Technology Program. Second, I'd like to review the criteria under which Clean Coal Technology projects are evaluated.

Perhaps in reviewing these two items some considerations may surface and may help us to at least understand the apparent lack of Western coal-based projects. With that understanding perhaps the Clean Coal III solicitation can be focused so as to encourage demonstration of a diversity of technologies utilizing both high- and lowsulfur coals, "with no prejudice towards any geographic region," to paraphrase a Congressional intent over the last four years.

According to the Annual Report to Congress, December 1987, the role of the Clean Coal Program is fourfold:

First, to serve as a cornerstone of the U.S. acid rain strategy; Second, to serve as an effective strategy for achieving the long-range goals in power production; Third, to be a passport to energy security; And finally, to enhance the competitive edge of the U.S. in the international marketplace.

The issue of acid rain seems rather straightforward, and clean coal technology projects, both proposed and selected, address the need to reduce the emissions of SO2 and NOx. However, perhaps we need to broaden the issue: not just acid rain, but include also our concern for the newly emerging concerns for global warming. This would add carbon dioxide to the list of pollutants to be addressed, and might expand the types of projects responding to Clean Coal III.

The second point, to be an effective strategy for long-range goals in our power production, this clearly points to a need to consider the future electrical powergenerating resources of this country, and to support the development of not only clean but also economical units, units capable of rapid construction with a high degree of performance efficiency over a wide range of sizes.

There's also a need to demonstrate environmental control options less sensitive to coal type; and for a wide range of boiler sizes and types. Present day technologies cannot meet these objectives in many situations. In fact, commercial conventional technologies, for both power production and pollution control, are nearing the end of their development potential.

In addition, development of processes which upgrade coal into commercial products will broaden its acceptability in both the utilities and industrial markets. Therefore, the next five to ten years will be critical in developing new energy options which will help meet America's energy objectives, both economic and environmental.

One of the successful outcomes of the Clean Coal Program should be a new collection of clean coal technologies that are not only environmentally improved, but also more efficient. Highly efficient, environmentally responsive coal-based power plants which can be easily and quickly fabricated in wide ranges of modular sizes. More emphasis on efficiency, would in my opinion help push Western-based projects. New technologies to meet the growing energy demands in the West, and to demonstrate the technologies that will be needed eventually in the East as older units, 30 and 40 years old, will be replaced.

The third element is really a part of the second, to be a passport to energy security, means efficiency, and it means coal. I've already touched on the importance of coal, the vastness of U.S. energy resources contained in the coal resource base. The Clean Coal Program should be used to promote energy security, efficiency, as well as to reduce emissions.

The Clean Coal Program is to help provide a competitive edge in an international marketplace. New technologies that enhance the export of U.S. coals is one of the goals. Projects that serve as a showcase for new clean coal technology concepts, new combustors, new scrubbers, new coal cleaning devices, and new power-generating options all using U.S. coals. Focus here must be for new projects.

There's another aspect not touched on in DOE's Annual Report to Congress. The international marketplace as it relates to the nations's competitive position, and the use of low-cost, environmentally-sound electrical power. Electrical power is, after all, one of the most driving forces behind economic success, success here and throughout the world. Strict environmental controls have added to the cost of the U.S. products, and in some way hindered our ability to compete in some markets. Clearly the intent of the Clean Coal Program is to reduce pollution, but it is also to sustain this country's economy in 1990 and beyond.

Now I'd like to turn briefly to the evaluation of Clean Coal II criteria. The program policy factors which were used to critique and select the various projects that were submitted. After reviewing the basic qualifications and preliminary evaluation components that would tend to favor or disfavor, encourage or discourage Western-based products.

Next comes the comprehensive evaluation. The comprehensive evaluation is made up of a number of parts: The technical proposal, the business and management proposal, and the cost proposal. The technical proposal is a weighted evaluation of selected criteria. There are two main considerations, commercialization factors and demonstration project consideration.

Commercialization consists of two basic parameters. The extent to which a proposed technology, when used at existing coal-fired facilities, can reduce total national emissions of SO2 or NOx, and the extent to which the proposed technologies can reduce transboundaries or interstate air pollution. No credit is given for reduction of emissions and applications where current commercial technologies can be used. Credit shall be given for technologies that make beneficial use of solid waste that may be generated.

The second use is cost effectiveness. Here the extent to which a proposed technology which was used at existing coal processing facilities, that is a cost per ton of pollutants removed, controlling emissions of SO_2 and NO_x, when compared to currently available control technology options to accomplish comparable emissions reductions. The extent to which the technologies affect the cost of producing electrical power will be considered.

Perhaps here, within these two commercialization factors, there may be an interpretation that could tend to reduce a role of Western-based projects. For example, the emphasis on existing coal-fired facilities. In the West, most coal-fired utilities already are using either low-sulfur coal, or have the latest emission control technologies commercially available. There is perhaps less incentive to seek out additional reductions.

Also, if one looks at the number of facilities and their age, power plants and industrial boilers tend to be larger and newer, again limiting the potential for both cost efficiency and effective additional reductions.

Quite frankly, the available pool of potential sites in which to conduct the demonstration projects is much more limited in the West than in the East. The cost effectiveness issue, targeted as it is on SO_2 and NO_x control, also would tend to diminish the number of suitable Western projects. Perhaps by emphasizing the efficiency aspect of power production of new projects, not just existing facilities, will more Western projects be developed.

The demonstration project factors include four areas that should be satisfied. One of these criteria is of concern. Let me explain that one. Environmental, health and safety, socio-economic, and other site-related aspects must be appropriate, The adequacy and appropriateness of the proposal, the suitability, quality, and adequacy of the site, the degree to which current emissions of SO_2 and NO_x are reduced, especially emissions which contribute to transboundary pollution.

In general, there is nothing contained in this criteria that would inherently discriminate against or lead to fewer number of Western projects. However, the emphasis on retrofitting existing facilities and on control of current SO_2 and NO_x emission likely reduces the number of Western projects that might otherwise be proposed. Therefore, perhaps a restating of intention of this criteria could help encourage additional Western products.

After all the reviews, program policy factors were applied to make the final selection, these factors are not used to indicate an individual project's merit, but to choose those projects that best achieve the program objectives. Again, there are three items to be considered. One, the desirability of selected programs for retrofitting and/or repowering existing coal-fired facilities.

Two, the near-term reduction of transboundary transmissions of SO_2 and NO_x.

Three, the collective ability of the projects to demonstrate economic reductions to a combination of existing facilities, and contribute to transboundary reductions in $S0_2$ and NO_x.

Once again, these criteria would, I submit, tend to favor Eastern based projects. I think the point is supported by looking at projects selected in Clean Coal I and Clean Coal II. While there's plenty of them, I don't think there's time to go through all of them, but there's a number of interesting observations one can make. First of all, there's a wide variety of technologies being demonstrated. Pressurized fluidized bed, limestone injection system, cyclone systems, coal gasification technologies, and industrial technologies, most aimed at SO_2 or NO_x cleanup. In looking at the coal types being addressed, the vast majorities tend to be high-sulfur, Eastern coals, which is fitting, given the thrust of the project directed towards acid rain. In terms of the project, itself, a large number is targeted to retrofitting existing small, 70 to 200 megawatt utility boilers or industrial boiler systems; again, the focus on reductions in SO2 and NOx through the application of these technologies.

The last point I'd like to make is that the projects typically involve a team approach with either an A&E firm, a utility, and an equipment manufacturer joining forces to demonstrate a technology. When one considers the potential for additional retrofit business if a technology works, the emphasis on Eastern based projects is perhaps even more likely.

In summing up, I think the Clean Coal Technology Program has nothing inherently inconsistent with the Western-based projects. However, there would appear to be a strong emphasis on retrofit and repowering technologies, which lend themselves to demonstration on existing older, smaller power units, and there are, or tend to be, more of these located in the East.

The emphasis on reducing SO_2 emissions in the West is modest in comparison to the East. In order perhaps to stimulate additional Western projects there is a need to

communicate to potential project developers that demonstration projects need not be confined to retrofit or repowering of existing units. The capability of retrofit or repowering is what's significant. Old or new should not matter in terms of demonstration.

Clean Coal III should consider giving additional weight to projects which further the Clean Coal Technology Program objectives of efficiency, lower cost, future power needs, and export potential. This may help stimulate interest in the Western-based programs.

Before closing I'd like to encourage those of you who might be thinking about Western projects. Amax Coal Industries is considering developing a proposal for Clean Coal III. We think we have a good shot at success, and meetings like this encourage us. The opportunity is there to develop a project with good people, and I'm sure you'll see more Western-based projects.

And, we would like to thank the Department of Energy, the Fossil Fuel people, Mr. Wampler and Mr. Siegel for their interest in the West and Western projects, and for giving us the opportunity to discuss or concerns. I do believe that they are committed to coal, and to enhance the use of coal, and together perhaps we can find some common ground upon which to push forward, and a successful new round of projects under Clean Coal III, and I thank you.

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Discussion Workshop Number One

Discussion Workshop Number 1

Steven A. Oldoerp, U.S. Department of Energy
Michael L. Jones, University of North Dakota, Energy and Mineral Research Center - Scribe

The general theme of the discussion group was that the Clean Coal program to date has definitely been biased towards the eastern coal groups. This was particularly evident in the second solicitation that focused on retrofit technologies and transboundary emissions. This discriminated against western fuels for the following reasons:

1. Most utility plants in the western region have been built since the 1970's and, as such, are not prime candidates for repowering.
2. Targeting transboundary emissions really focuses on the high-sulfur areas of Illinois, Ohio, Indiana, etc.
3. Evaluating projects in terms of cost per ton of SO2 removed places all low-sulfur western coals at a disadvantage. Since sulfur is low in the coal, SO2 in the flue gas is already low and removal from this lower level is inherently more expensive. A more equitable criterion would be based on the pounds of pollutants per KWh of power.

The group felt that the current structure of the CCT program was designed to maintain the status quo: repowering the existing facilities with existing fuels, and protecting the eastern coal interests from competition from the west.

In order to have the western coal groups participate in the CCT program the following changes are suggested.

1. Allow for projects that broaden the utilization base for coal. This would include items such as production of coal liquids or

chemical feedstocks.

2. Emission level should be judged by the SO2/NOx level per KWh, thus leveling the playing field between eastern and western coals.
3. Precombustion technologies need to be specifically called out. This is especially important for western coal where moisture reduction, slurry production, or other technologies may make the fuel far more attractive for the energy market.
4. Part of the evaluation criteria should take into account the impact of the technology on the entire United States. Highly site-specific projects should not receive high marks.
5. Consider technologies that assist U.S. coals to compete in the international marketplace as well as specialized markets such as California, where unusual environmental regulations apply.
6. The PON was confusing and needs clarification. The financial instructions were vague. This lack of detail would tend to penalize small business ventures. The group strongly suggests a two-stage submission process. Stage one would be a less complex "white paper" on the proposed project. At this stage, DOE and proposer could interact to clarify the project. If deemed competitive, DOE would ask for the detailed proposal. Since only a limited number of projects would pass the first level of screening, proposal cost would be greatly reduced.

Finally, considerable discussion took place about the state of technology for western coals. The dollars for low-rank coal research and development have been much lower than that available for eastern coal research. This has

led to a situation where technologies that can capitalize on the unique properties of the western coals are not ready for demonstration. Additional funding for western coal research and development must be available in the future to help remedy this situation.

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Discussion Workshop Number Two

Discussion Workshop Number 2

Gary E. Voelker, U.S. Department of Energy - Moderator
Dawn Kladianos, Western Research Institute - Scribe

There was an excellent cross-section of participants in Working Group #2. Group members represented architectural and engineering firms, coal companies, national laboratories, power companies, railroad companies, research organizations, and state Government agencies. Also, groups with broad memberships were also represented, including the Electric Power Research Institute, the Clean Coal Technology Coalition, the National Coal Association, and the Western Interstate Energy Board.

The discussion of Working Group #2 concentrated on two major areas:

1. Why was there a disproportionately low number of Western projects proposed in CCT-1 and CCT-2?

2. What can be done to improve CCT-3 to encourage Western participation?

Each major area is highlighted below, and the discussion includes comments and recommendations made by members of Working Group #2.

Area 1: WHY WAS THERE A DISPROPORTIONATELY LOW NUMBER OF WESTERN PROJECTS PROPOSED IN CCT-1 AND CCT-2?

Working Group #2 gave the following reasons for low Western project participation in CCT-1:

- A short response time was required.

- Western sites and facilities are newer and, therefore, already meet NSPS requirements.

- There are fewer promising sites in the West than there are in the East.
- The expanded use of Western coals has occurred primarily in the last 10 to 15 years. Therefore, technologies that exploit the unique properties of Western coal are at an earlier stage of development and are potentially riskier projects. The evaluation criteria placed high risk projects at a disadvantage.
- CCT-1 was perceived as an Eastern coal program.

The Group gave the following reasons for low Western-project participation in CCT-2:

- The criteria under CCT-2 were even more restrictive than the criteria for CCT-1.
- CCT-2 was perceived to be an Eastern high sulfur coal program.

AREA 2: WHAT CAN BE DONE TO IMPROVE CCT-3 TO ENCOURAGE WESTERN PARTICIPATION?

Working Group #2 recommended the following objective statement for CCT-3:

> The objective of CCT-3 is to demonstrate advanced technologies to expand the utilization of all U.S. coals with improved economics, efficiency, and environmental performance.

The Group felt that this objective would provide equal treatment and equal opportunities for Western and Eastern clean coal technology projects.

Next, Working Group #2 conducted a thorough discussion of the technical evaluation criteria for CCT-1 and CCT-2 in order to come up with recommendations for CCT-3 evaluation criteria. The technical evaluation criteria that were discussed are listed below, along with the Group's recommendations for improving the criteria for CCT-3.

Demonstration Project Factors

o Technical Readiness Criteria

  - Revise evaluation criteria to allow for higher risk projects. Since Western sites are newer and technologies that exploit Western coals are at an earlier stage of development, the projects in the West are higher risk projects. The Group recognized that implementation of these criteria may not increase the number of proposals for Western concerns, but they could increase the number of awards to Western proposers.

o Adequacy, Appropriateness, and Relevance of Demonstration Criteria

  - Retain these criteria as they were written in CCT-1 and CCT-2.

o Environment, Health, Safety, Socioeconomic and Other Site-Related Criteria

  - Delete the criteria used to evaluate the degree to which current emissions of SO_2 and NO_x are reduced. Any criteria that favors the selection of projects on their ability to remove sulfur unfairly favors Eastern high sulfur coals.

o Technical and Management Approach Criteria

  - Retain these criteria as they were written in CCT-1 and CCT-2.

Commercialization Factors

o Environmental and Cost Effectiveness Criteria

  - Keep the environmental and cost effectiveness evaluation criteria as they were written in CCT-2.

- Re-evaluate the application of the evaluation model. Describe the model and the methods of applying the model for CCT-3. Forcing technologies to use an Eastern Freeport coal as a reference coal in CCT-2 placed precombustion technology and low sulfur Western coal at a very significant unfair disadvantage. This item was the number one concern of the Group.

o Marketability Criteria

- Include criteria to evaluate the extent to which the technology will expand utilization of U.S. coals.

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Discussion Workshop Number Three

Discussion Workshop Number 3

George G. Weth, U.S. Department of Energy - Moderator
John Ballenot, Western Research Institute - Scribe

The discussants were from a number of western states, including Wyoming, Colorado, Oklahoma, California, and Alaska, and represented a variety of organizations, including state agencies, utility companies, coal producers, and engineering firms. The discussion covered three main areas: reasons for the lack of western participation in the program's second solicitation (CCT 2), suggestions for increasing western participation in the third solicitation (CCT 3), and general recommendations for improving the solicitation process.

In discussing the low level of western participation in CCT 2, the group stressed that the language of the program opportunity notice (PON) was not generally compatible with western coal projects. While the PON called for projects involving the "retrofitting or repowering of existing facilities," most western coal projects are centered around coal beneficiation and fuel upgrading to increase fuel value and reduce transportation costs. There was a perception among the western coal industry that CCT 2 was generally limited to combustion technologies, the group agreed.

The discussants also noted that the Lewis-Davis criteria used to evaluate proposals were diametrically opposed to western marketing concerns. Refueling and fuel switching seemed to be the only ways that western coal projects could be applicable to CCT 2, but these were not allowable under the evaluation criteria.

The group offered several suggestions for increasing western participation in CCT 3. In general, the participants recommends a broader-based approach to the solicitation and evaluation processes. A return to the use of CCT 1 criteria would be a step in the right direction, they said.

In particular, the group suggested that DOE open up the program to newer, more innovative clean coal technologies, which would have a higher payoff in terms of economics and environmental concerns. It was suggested that the PON should be capable of giving extra credit to projects that look more to the future (i.e., lower emissions). Some suggested that the program should include pilot-scale projects as well as full-size demonstrations. Recognizing that these higher risk projects may be getting into the research and development area, the group noted that if the CCT program could not accommodate this kind of project, then DOE should at least continually review its research and development program to make sure these types of projects are in the pipeline for future consideration.

The discussants also suggested that DOE give special consideration to special western concerns related to the low sulfur content of western coals. They said that DOE should give credit for NOx reduction alone, because NOx emissions are the major problem in the West. Also, the CCT program should try to accommodate projects that target very low sulfur emissions--e.g., projects that will reduce sulfur emissions by 90 percent from an already low-sulfur coal.

Reductions in SO2 and NOx emissions approaching single-digit levels may help to open up new markets, such as California, to the use of coal, the group

said. It was felt that DOE should give credit for western coal projects that would open up these new markets, including the Pacific Rim. The present CCT program structure, however, does not allow this. The PON should also be capable of considering other coal consuming technologies which provide marketable coal products.

The group also offered a number of general recommendations for improving the program's solicitation and evaluation processes. The discussants said the evaluation criteria, as written, were very confusing to those not used to dealing with DOE. They strongly urged DOE to write clear and concise guidelines, and eliminate the ambiguous language for proposal preparation. The PON objective should clearly identify DOE request and it should be unmistakable as to who should try to respond to the solicitation.

The group expressed a great deal of concern about the time and money needed to prepare a project proposals for the CCT program. A company might spend hundreds of thousands of dollars on a proposal only to find that it never had much of a chance of being approved. Some proposed a two-phase application process. In the first phase, the proposer would submit only the minimum of information necessary for DOE to decide whether the proposed project is worth very serious consideration. Proposers who passed this first screening test would then submit more detailed, full-scale proposals. This procedure would reduce the cost for companies whose proposals are rejected, though it might increase the total cost for proposers who eventually receive project approval. Nevertheless, the group noted that if DOE could make the PON much clearer in terms of what DOE is looking for and who should respond, then there might be no need for a two-phase approach.

Discussion Workshop Number Four

Discussion Workshop Number 4

David S. Jewett, U.S. Department of Energy - Moderator
Gerald H. Groenewold, University of North Dakota, Energy and Mineral Research Center - Scribe

The discussion group included a diverse collection of individuals from industry, research entities, and state and federal agencies. Very few of the participants had any experience with federal proposal submission. The morning and afternoon discussions focused on a few specific issues/topics. These included:

- the belief that CCT is strictly an eastern program,
- the relative lack of maturity of western coal technologies which suggests that need for research and development in addition to demonstration,
- the cost of submission as a deterrent to smaller companies,
- the relative lack of state funding in the west as cost share is a major deterrent,
- the need for a staged approach to proposal submission and negotiation (eliminate the "crap shoot" aspect as currently perceived).
- the relative lack of host sites in the west (also, most western sites are newer and larger than eastern sites), and
- the need to consider pre-treatment as well as post-treatment technologies.

Several participants indicated a desire for an expanded role for university-based research groups in the CCT program. These individuals felt that technology transfer from universities to industry is a key element of our economy and an element that should be promoted through the CCT program.

Limited discussion focused on the desire by utilities to receive more feedback/guidance early in the submission process. DOE indicated a willingness to consider providing additional assistance. This would require extreme care to avoid charges of favoritism.

Several participants indicated frustration with the relatively restrictive nature of CCT-2. The general consensus was that CCT-3, 4, and 5 should be much less restrictive (much like CCT-1). Preference was strongly voiced for an "all coals and all technologies" approach. Repowering opportunities and needs are not great in the west; indeed, this is often undesirable. Specific technologies or issues mentioned as of interest to the west included FBC NOx control, oxygen gasification, mild gasification, UCG, IGCC, and water-jet mining.

Several comments indicated a western perception that the CCT program is designed "to help my competition squeeze me out of the market." Several comments also suggested confusion regarding the "repayment plan."

The group suggested several specific solutions to these problems. These were:

- simplify the PON - streamline and plain language,
- open to all coals and all technologies,
- provide for a staged approach - recognize and accommodate the private sector decision-making process,
- find ways to decrease the proposal costs (possibly lengthening the time for proposal preparation),
- allow some contact between DOE reviewers/negotiators and proposers regarding negotiable issues such as cost share, and
- clarify the repayment issues.

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Project Descriptions

CLEAN COAL TECHNOLOGY-I
PROJECT SUMMARIES

1. TIDD PFBC DEMONSTRATION PROJECT

The project objective is to build and operate a 70-MW_e pressurized fluidized-bed combustion (PFBC) combined-cycle powerplant demonstrating that this new coal-burning technology will permit the burning of high-sulfur coal to produce electricity in a more economical and efficient way than is commercially available, while meeting or exceeding stringent U.S. environmental standards.

PFBC is a clean coal technology that can burn high sulfur coal in an environmentally superior manner; that is, the emissions of SO_x and NO_x are held within current environmental limits. Unlike conventional technologies, combined-cycle PFBC provides for increased electric generation efficiency through a combined gas and steam cycle.

High pressure in the process permits hot gases from the combustor, after cleaning, to operate a gas turbine-generator. Gases from the combustor pass through high efficiency cyclones to remove approximately 99 percent of the solids in the gas stream before entering the gas turbine. The flue gas from the gas turbine exhausts through an economizer, an electrostatic precipitator, and a stack.

2. LIMB DEMONSTRATION PROJECT EXTENSION

The objective of the project is to test a variety of coals and sorbents to demonstrate the limestone injection multistage burner (LIMB) process as a retrofit system for simultaneous control of sulfur and nitrogen oxides in the combustion process. Project goals for LIMB are to demonstrate up to 60-percent NO_x and SO_x reductions. Additionally, using the Coolside duct injection (Coolside) process, a base of sorbent and one coal will be tested to demonstrate in-duct sorbent injection, upstream of the humidifier and precipitator, to show SO_x removals of up to 80 percent.

This project will be conducted at Ohio Edison's Edgewater Plant in Lorain, OH, on a commercial, 105-MW_e boiler. The present EPA-sponsored project will test only one coal and sorbent combination for the LIMB process. The DOE project will demonstrate the LIMB process with multiple coal and sorbent combinations to show the general applicability of the process using medium-and high-sulfur coal. The DOE project will also demonstrate the Coolside process using high-sulfur coal on a commercial scale. Until now, the Coolside process has been demonstrated only at the 0.1-MW and 1-MW scale.

3. ADVANCED CYCLONE COMBUSTOR DEMONSTRATION PROJECT

The project demonstrates an advanced horizontal cyclone combustor with integral sulfur, nitrogen, and ash control systems. Air is mixed with fuel in standard burners or combustors that are attached to the outside walls of boilers. The burning mixture is then discharged into the boiler, heating water in the tubes to produce steam. The Coal Tech combustor, which will replace a standard burner, also mounts on the outside wall of the boiler,

mixes coal, sorbent (limestone) and air, provides ignition, and removes ash before discharging the hot combustion products to the boiler. The 30-MMBtu-per-hour combustor is approximately 5 feet in diameter and 8 feet long.

The specific objective is to demonstrate an air-cooled cyclone, pulverized coal combustor of an advanced design to show that 90 percent of the coal ash can be retained and rejected, that NO_x emissions can be held to 100 parts per million and that SO_x emissions can be reduced by up to 90 percent. If successful and implemented, boiler slagging and acid rain precursor emissions would be reduced, and additional high-sulfur U.S. coal could be used in an environmentally acceptable manner.

4. GAS REBURNING/SORBENT INJECTION DEMONSTRATION PROJECT

This project is to conduct three full-scale utility demonstrations to show that the combustion of gas reburning and sorbent injection can reduce NO_x emissions by 60 percent and SO_x emissions by 50 percent from pre-NSPS boilers. If successful, the project will demonstrate a process and equipment that could be easily retrofitted to about 900 U.S. utility boilers (tangentially fired, wall-fired, and cyclone-fired). This project would also make high-sulfur U.S. coals more usable and would reduce SO_x and NO_x emissions.

This project will demonstrate the gas reburning/ sorbent injection process (GR/SI) on three different boilers representing three different combustion configurations.

- A tangentially fired, 80-MW_e boiler owned by Illinois Power Company and located near Hennepin, IL. This boiler has burners mounted at the corners and directs the burning coal and air toward points just off the center of the boiler.

- A wall-fired 117-MW_e boiler owned by Central Illinois Central Light Company and located near Bartonville, IL. This boiler has burners that direct the burning air/coal into the furnace in a direction that is perpendicular to the wall in which the burners are mounted.

- A cyclone-fired 40-MW_e boiler owned by City Water Light and Power Company located in Springfield, IL. This boiler has a combustion system that is external to the boiler, and the hot combustion products enter the boiler after the combustion is complete.

5. UNDERGROUND COAL GASIFICATION DEMONSTRATION PROJECT

This project will demonstrate that underground gasification of steeply dipping subbituminous coal beds is a cost-effective, reliable, and environmentally acceptable alternative to conventional mining with subsequent surface gasification. The specific objective of this project is to conduct a commercial-scale demonstration of steeply dipping bed underground coal gasification to provide synthesis gas for a small, commercial ammonia and urea plant.

The demonstration facility will operate for 12 months, gasifying 500 to 1,000 tons of Wyoming coal per day to produce 24-48 million standard cubic feet per

day of product gas. This gas will then be used to produce 450 tons of urea and 90 tons of ammonia per day. The feedstock gas for the ammonia and urea plants will be produced by using two UCG modules operating simultaneously.

6. THE APPALACHIAN IGCC DEMONSTRATION PROJECT

The objective of this project is to design, build, and operate a grass-roots, advanced coal gasification combined-cycle, power generation plant that will utilize high-sulfur, Eastern U.S. bituminous coal to demonstrate an efficient, economical, and environmentally advantageous method of generating electric power.

An advanced concept has been developed that improves upon this first-generation IGCC technology. By using a KRW air-blown gasifier (which consumes less auxiliary power than an oxygen-blown system), hot gas cleanup, and an innovative tail gas treatment processing scheme, the concept provides higher thermal efficiency and superior environmental performance when compared to first-generation systems. This advanced approach will offer an excellent option for meeting future and potentially more stringent environmental emission constraints. Its standardized modular design and simple process configuration are also expected to yield significantly lower engineering and equipment costs, while providing excellent flexibility in the capital expenditure required.

7. PROTOTYPE COMMERCIAL COAL/OIL COPROCESSING PROJECT

The project objective is to build a grass-roots prototype, commercial coal/oil coprocessing plant to convert high-sulfur, high-nitrogen, bituminous coal and poor-quality petroleum residues to clean liquid fuels, using ebullated-bed reactor technology.

Coal/oil coprocessing yields liquid fuels that are low in sulfur, nitrogen, and trace metals, and high in heating value. These liquid products can be used directly as a clean-burning boiler fuel or further processed in a conventional petroleum refinery to produce transportation fuels. Nitrogen (in the form of ammonia) and sulfur are recovered as byproducts, thereby avoiding their introduction into the atmosphere as SO_x and NO_x. Hydrocarbon gases are also collected as byproducts in the form of liquefied petroleum gases (LPG).

8. NUCLA CFB DEMONSTRATION PROJECT

The objective of this project is to demonstrate the feasibility of circulating fluidized-bed (CFB) combustion technology and to evaluate the economical, environmental, and operational benefits of CFB steam generators on a utility scale.

Three small, coal-fired, stoker-type boilers at the Colorado-Ute Nucla Station were replaced with a single CFB steam generator capable of driving a new 74-MW_e turbine generator. Extraction steam from this turbine-generator will power the three existing turbine generators of 12 MW_e each. The majority of other existing plant equipment is also being utilized to minimize costs and to demonstrate the suitability of CFB technology for retrofit and life extension of existing units. During the two year test, period the plant will be operated like any other commercial power plant, feeding power into the electrical grid.

9. ADVANCED SLAGGING COAL COMBUSTOR UTILITY DEMONSTRATION

The project's objective is to demonstrate an advanced slagging coal combustor at a scale suitable for utility application. The project will involve converting an existing utility boiler from oil to coal, while meeting environmental standards and without derating the unit.

This project will extend the demonstration of a slagging coal combustor from the small industrial boiler demonstration (40 MMBtu per hour) to a full-scale utility boiler retrofit demonstration, converting oil-firing to coal-firing using four 160-MMBtu-per-hour combustors and controlling NO_x, SO_x, and particulate emissions to meet environmental standards both economically and without derating the boiler.

A boiler in an Orange and Rockland Utilities power plant located at Stony Point, NY, will be retrofitted with four combustors, including pulverized coal and limestone feed systems, slag handling and particulate filter systems, and modification of heat exchange and gas flow systems. During the design phase of the Orange and Rockland project, coal-burning tests and calcined limestone recycle tests will be conducted at TRW's industrial-scale slagging combustor test facility located in Cleveland, OH.

10. CLEAN ENERGY IGCC DEMONSTRATION PROJECT

This project will demonstrate the technical, environmental, and economic performance of an advanced integrated gasification combined-cycle system in a repowering/cogeneration application at the integrated commercial scale. The system will utilize IGT's U-Gas process (fluidized bed gasifier) with hot gas cleanup.

An integrated gasification combined-cycle powerplant will be designed to convert high-sulfur West Virginia coal into electric power and steam in an environmentally acceptable manner, while offering a significant reduction in capital and operating costs over conventional coal-based technologies with flue gas cleaning. The proposed project concept is based on the U-Gas coal-gasification process with limestone injection for sulfur removal. Hot particulate removal will be accomplished by a zinc-ferrite sulfur removal process. The product, low-Btu gas, will be combusted in a gas turbine with a steam generator to recover residual heat. The low-Btu gas will be combusted in a gas turbine combined-cycle powerplant.

11. COMBUSTION ENGINEERING INC.

The Combustion Engineering Inc. proposal would extend an ongoing coal cleaning program sponsored by the Electric Power Research Institute, the research arm of the electric utility industry. It would add combustion testing of coals that had been cleaned by advanced processes in EPRI's Coal Cleaning Test Facility at Homer City, Pennsylvania. Small scale combustion testing would be done first, with selected coals then test fired in commercial scale 200-megawatt boilers. The project would take 36 months.

12. UNITED COAL COMPANY

United Coal proposes to demonstrate how fine particles of low sulfur coal can be recovered from a mine waste disposal pond. The refuse slurry will be removed from the impoundment and pumped through a microbubble flotation device where the small coal particles will be separated from the waste. After drying, the recovered coal would be in the form of a low ash, low sulfur granular form. The project will take place over a two-year period at the Sharples Coal Facility in Logan County, West Virginia.

13. WESTERN ENERGY COMPANY

The Western Energy Company proposes a novel coal cleaning process to improve the heating value and reduce the sulfur content of western coals. Typical western coals may contain moisture as much as 25 to 55 percent of their weight. The high moisture and mineral content of the coals reduces their heating value to less than 9000 BTUs per pound.

The Western Energy process would upgrade the coals, reducing their moisture content to as low as one percent and producing a heating value of up to 12,000 BTUs per pound. The process also reduces sulfur content of the coals, which can be as high as 1.5 percent, to as low as 0.3 percent. Western Energy's project will be conducted at a 50 ton per hour unit adjacent to a Montana Power Company power plant in Colstrip, Montana.

DESCRIPTION OF SELECTED ICCT PROJECTS

1. American Electric Power Service Corporation

The proposer intends to repower two commercially operating 150 MWe pulverized coal-fired electric generating units of early 1950's vintage by replacing the two boilers with a single pressurized fluidized bed (PFB) combustor/gas turbine module capable of generating 330 MWe. The net thermal efficiency of the repowered plant will be about 38% (with SO_2 and NO_x control); this compares with the present efficiency of 36.5% (without SO_2 and NO_x control). Specific performance objectives when burning high sulfur (4%) coal are expected to result in greater than 90% sulfur retention and less than 0.3 lb. NO_x emissions per million Btu.

The project is based on more than 10 years of development work by the proposer on PFB technology and will build upon the experience gained from the 70 MWe Tidd PFB Demonstration Plant currently under construction under the first Clean Coal Technology solicitation. The units to be repowered are located at the Philip Sporn Plant in Mason Country, West Virginia.

2. Bethlehem Steel Corporation

This proposal involves retrofitting the existing coke gas cleaning plant (coal chemical plant) at the Bethlehem Steel Sparrows Point (Maryland) steel plant which consists of two coke batteries. Currently, the coke oven gas (COG) from the smaller of the two batteries is recycled directly to the coke ovens without chemical recovery or cleanup. The COG from the larger of the two batteries undergoes both chemical recovery and cleanup prior to its use as a fuel gas in various plant operations.

Under the proposed project, the COG would be cooled using a recirculating liquor with a (closed) indirect cooling tower thus eliminating the benzene and other emissions associated with the atmospheric final gas cooling tower now in use. Ammonia and H_2S would be removed by absorption into an ammonia liquid solution with subsequent steam stripping of the combined H_2S and ammonia vapors. This combined stream is then passed to a system where the ammonia is catalytically destroyed (i.e., converted to H_2 and N_2) and a portion of the H_2S is oxidized to SO_2 for input to the Claus plant as a combined H_2S/SO_2 stream. The COG that streams from both coke batteries would be processed with this system.

3. Combustion Engineering, Inc. (Dry Sorbent Injection)

This project is a demonstration of three dry sorbent injection technologies: In-Duct Injection, In-Duct Spray Drying, and Convective Pass Injection for flue gas desulfurization. The technologies involve injection of a calcium-containing sorbent either into the convective pass of the furnace or into the duct between the air preheater and the particulate control device. The sulfur dioxide in the flue gas reacts with calcium sulfite and calcium sulfate, which are removed in the particulate control device along with fly ash.

This 180 MWe demonstration involves the retrofit of Virginia Electric and Power Company's Yorktown Plant Unit 2 in York County, Virginia. The objectives of this program are (1) to demonstrate reduction in sulfur oxide emission by fifty percent or greater using these technologies, and (2) to provide technical,

economic, environmental, and operating data to support commercialization of these technologies by the electric power generation industry.

4. Combustion Engineering, Inc. (Repowering)

This project will demonstrate Combustion Engineering's pressurized, airblown, entrained-flow coal gasification repowering technology on a commercial scale. The syngas will will be cleaned of sulfur and particulates and then combusted in a gas turbine (40 MWe) from which heat will be recovered in a heat recovery steam generator (HRSG). Steam from the gasification process and the HRSG will be used to power an existing steam turbine (25 MWe).

The proposed project is selected for demonstration at the Lakeside Generating Station of City Water, Light and Power, Springfield, Illinois. The selected site with associated characteristics and costs includes repowering an existing steam turbine to produce 65 MWe via the combined cycle mode. The process will remove about 12 tons per day of sulfur from a daily consumption of 480 tons of high sulfur (2.5%) Illinois No. 5 coal, a reduction efficiency of over 99%. NO_x is expected to be reduced by over 80%.

5. Combustion Engineering, Inc. and Snamprogetti U.S.A., Inc.

The proposed project is to demonstrate the WSA-SNOX technology for catalytically removing both SO_2 and NO_x from flue gas and producing a saleable by-product, concentrated sulfuric acid. No sorbents are used, consequently, waste by-products which normally result from their use are not formed. Two catalytic reactors are used to first remove NO_x by converting it to N_2 in an SCR reactor and then to oxidize the SO_2 to SO_3. The SO_3 is subsequently hydrated and then condensed as H_2 in the WSA tower.

The 35 MWe demonstration will be conducted by retrofitting an 100 MWe existing power plant, Ohio Edison's Niles Station Boiler No. 2 in Trumbull County, Ohio. The objective of this project is to demonstrate the WSA-SNOX technology on an electric power plant firing high sulfur Ohio coal. A reduction efficiency of 90% or more for both SO_2 and NO_x is expected. The demonstration will feature full-scale components and modules.

6. Otisca Industries, Ltd.

The purpose of the proposed project is to demonstrate the manufacture, storage, handling, and utilization of an ultra clean coal water slurry, known as Otisca Fuel. The core of the manufacturing process for Otisca fuel is the Otisca-T Process, which consists of reducing the raw particle size to effect the releases of mineral matter from the coal, and recovering the ultra clean coal via a selective agglomeration process that employs pentane as the agglomerating agent. The pentane is removed from the recovered ultra clean product coal and reused. Less than 0.25 weight percent pentane remains with product coal. The mineral matter and pyrite remain in the aqueous phase and are removed from processor water by settling. This process is claimed to remove virtually all the pyritic sulfur and a significant quantity of the mineral matter from virtually any coal, while recovering over 95% of the input coal Btu's in the product coal.

The Otisca Fuel will be retrofitted to industrial boilers that are used for the production of steam. The proposed program will support the conversion of up to

seven industrial boilers in the central New York state area (Syracuse, Jamesville and Oneida) from their existing configuration, i.e., the burning of oil, gas, or high sulfur coal, to one that allows the combustion of Otisca Fuel.

7. Passamaquoddy Tribe

The Passamaquoddy Tribe intends to demonstrate a scrubbing system for removing SO_2 emissions from existing coal-burning cement kilns. The project features the Tribe's "Recovery Scrubber", which can reduce SO_2 emissions by over 90%, uses kiln waste dust as the scrubbing reagent, produces a recycle stream for feeding to the kiln and two potentially saleable by-products (potassium-based fertilizer and distilled water), and generates no new wastes.

The demonstration involves retrofit of the Tribe's cement plant, Dragon Products Company, which is located in Thomaston, Maine. The demonstration will treat the entire gas stream from the cement kiln, which has a capacity of 470,000 tons/year of cement clinker. By-product recovery will be demonstrated through the use of a heat exchanger/evaporator.

8. Pure Air

This retrofit project is for a commercial scale advanced limestone scrubber flue gas desulfurization system. A single, 529 MWe absorber module will clean the flue gas from four existing boilers. The system design will use a high velocity, cocurrent flow absorber with direct injection of pulverized limestone. The system design includes a new, and innovative, single-loop process which produces commercial gypsum, using in-situ forced oxidation accomplished by a rotary air sparger. A novel waste water evaporation system will be evaluated that potentially eliminates water disposal/treatment problems associated with the use of high chloride content coals and essentially provides no water discharge. A cyclic reheater will be used to reduce the operating costs normally associated with stream reheat. The overall goal of the project is to demonstrate that the innovative features of the proposed approach combined with by-product gypsum sales will result in a system capable of 90% or higher SO_2 capture at a cost that is 50% lower than that which can be achieved by currently available FGD systems.

The proposed demonstration site is the Northern Indiana Public Service Company's Dean H. Mitchell Station located in Gary, Indiana.

9. Southern Company Services, Inc. (Chiyoda-121)

The proposed project is for the demonstration of the Chiyoda Thoroughbred-121 flue gas desulfurization process. This process uses a unique absorber design known as the jet bubbling reactor which combines limestone FGD reactions, forced oxidation and gypsum crystallization in one process vessel. As a result, the process is mechanically and chemically simpler than conventional FGD processes and can be expected to exhibit lower cost characteristics. As part of the demonstration, innovations to this process will be evaluated to determine whether costs can be reduced further, including the use of fiberglass reinforced plastic absorber, elimination of flue gas rehead and a space absorber module, and gypsum stacking to reduce waste management costs. The ability of this technology to remove particulates will also be evaluated.

A 2.9% sulfur coal will be used for the demonstration which will be conducted by retrofitting Georgia Power Company's 100 MWe Yates Newman Plant Unit 1, near Atlanta, Georgia. Project objectives include the demonstration of 90% SO_2 control at high reliability with and without simultaneous particulate control.

10. Southern Company Services, Inc. (Selective Catalytic Reduction)

This retrofit project is for the purpose of demonstrating that a combination of combustion of combustion modification technology and Selective Catalytic Reduction (SCR) provides the most cost effective means of reducing nitrogen oxide emissions from power plants. The demonstration will focus on the application of SCR to high sulfur coals.

The demonstration plant will be located between Units 5 (75 MWe) and 6(320 MWe) of Gulf Power Company's Plant Crist near Pensacola, Florida. This location allows access to flue gas from approximately 3% sulfur coal under a variety of different NO_x and particulate levels.

Once SCR has been demonstrated to operate economically on high-sulfur American coals, it will represent a technology which has the capability to obtain 90% reduction of NO_x emissions for utility and industrial boilers. The technology can potentially be applied to all types of boilers, including cyclone-fired boilers which cannot be easily retrofitted with other developing NO_x control technologies.

11. Southern Company Services, Inc. (Tangential-fired NO_x)

The project proposed by Southern Company Services will demonstrate three advanced NO_x control technologies for retrofit applications to tangential-fired, pulverized-coal boilers: (1) advanced overfire air which consists of deep stage high rate air injection, (2) low NO_x concentric fired systems, and (3) advanced tangential-fired systems. The advanced NO_x control technologies will be sequentially applied to a single tangential- fired boiler at Unit 2 of Gulf Power Company's Plant Smith in Lynn Haven, Florida. The proposed 180 MWe demonstration boiler is representative of a large class of tangential boilers.

The performance and NO_x reduction capabilities of each advanced NO_x reduction technology will be evaluated separately and then in combined operation in a logical sequence on a single reference demonstration boiler. The combination is expected to reduce NO_x by up to 60%. Each technology will be tested for at least three months under typical dynamic boiler operating conditions. This will ensure an accurate, comparative measure of the long-term NO_x reduction capabilities of each technology under typical operating conditions.

12. Southern Company Services, Inc. (Wall-fired NO_x)

Southern Company Services, Inc. intends to demonstrate three advanced NO_x control technologies for retrofit applications to wall-fired, pulverized-coal boilers. The three NO_x control technologies are Advanced Overfire Air (AOFA) which consists of deep stage high rate air injection, second generation low NO_x burner (LNB), and LNB with AOFA. The advanced NO_x control technologies will be sequentially applied to a single furnace, sub-critical, wall-fired boiler at the Georgia Power Company's Hammond Plant Unit 4 at Rome, Georgia. The proposed 500 MWe demonstration boiler is representative of a large class of wall-fired boilers.

The performance and NO_x reduction capabilities of each advanced NO_x control technology will be evaluated separately first and then in combined operation on the same demonstration boiler. The combination is expected to reduce NO_x emission by up to 60%. Each technology will be tested for at least 3 months under typical dynamic boiler operating conditions. This will ensure an accurate, comparative measure of the NO_x reduction capabilities and performance characteristics of each of these technologies.

13. Southwestern Public Service Company

Southwestern Public Service Company (SPS) is proposing to repower an existing 256 MWe steam turbine generator at the Nichols Station Power Plant, located near Amarillo, Texas, using a circulating fluidized bed (CFB) boiler. This repowering project is intended to demonstrate the use of a scaled-up CFB boiler in order to promote commercialization of larger size CFB boilers than are presently available. The boiler will generate 1,800,000 lbs/hr of steam at 2005 psi and 1005°F. The preheater will be of the heat pipe type - a relatively new innovation in utility boiler applications. The CFB is scheduled to burn Wyoming and New Mexico subbituminous coal.

The largest CFB boiler now under construction is the Combustion Engineering boiler for 150 MWe lignite-fueled unit at Texas-New Mexico Power's (TNP) plant. SPS's proposed demonstration is approximately 1.6 times larger than the TNP boiler. There will be a 2 year test program after which the facility will continue to operate commercially. For the repowered facility, SO_2 and NO_x will be controlled by 70% and over 80%, respectively.

14. The Babcock & Wilcox Company (Cyclone Reburning)

The objective of this project is to demonstrate that coal can be used as a reburning fuel for reducing nitrogen oxides on a coal-fired cyclone boiler. Reburning technology is the only in-furnace NO_x control technology that has been shown to be technically feasible for cyclone boilers.

A coal reburning retrofit will be designed, fabricated and installed in Wisconsin Power & Light Company's Nelson Dewey Plant Unit #2 which is located along the Mississippi River in Cassville, Wisconsin. Pilot scale testing and mathematical modeling will be utilized in the retrofit design. A successful demonstration of the coal reburning technology could result in achieving a 50% NO_x reduction with no resultant decrease in boiler efficiency. This technology is expected to be applicable to all cyclone boilers larger than about 80 MWe.

15. The Babcock & Wilcox Company (SOX-NOX-ROX Box)

This project is a post-combustion flue gas cleanup demonstration of combined removal of SO_2, NO_x and particulates. Ammonia and a calcium-based sorbent are injected upstream of a high temperature baghouse. The sorbent reacts with SO_2 and is removed in the baghouse. In the presence of the selective catalytic reduction (SCR) catalyst, NO_x is reduced by NH_3 to nitrogen and water. Particulate removal is accomplished in the baghouse using high temperature bags. It is estimated that SO_2 removals of about 50% or more can be achieved with NO_x removals of 90% and particulate removals exceeding 99% in a single unit.

This SOX-NOX-ROX Box concept will be demonstrated by retrofitting a 5 MWe slipstream of flue gas at Ohio Edison's R.E. Burger Station in Belmont County, Ohio.

16. TransAlta Resources Investment Corporation

For this project, TransAlta proposes to retrofit and demonstrate a low NO_x/SO_2 (LNS) Burner and a coal pulverizer system on the 33 MWe Unit/cyclone boiler at Southern Illinois Power Cooperative's Marion Plant in Marion, Illinois. Two LNS burners, each rated at 200 million Btu/hr, will be retrofitted to the existing Babcock & Wilcox cyclone boilers, and are expected to reduce both NO_x and SO_2 emissions by up to 90%.

The LNS Burner is a three-stage, entrained flow slagging combustion system. Sulfur is captured by injecting limestone at a calcium to sulfur ratio of 2 or less in a very fuel-rich primary stage. In the second fuel-rich stage, gaseous nitrogenous compounds, including NO_x, are converted to molecular nitrogen. Finally, in the third stage excess air is added to complete combustion and to obtain full heat release. It is in the second (i.e., NO_x destruction) stage that combustion temperatures are sufficiently high to allow removal of molten slag which includes the captured sulfur in a glassy ash matrix. TransAlta's LNS Burner retrofit also includes a simple impact-type separation, in which a series of tubes extend vertically down through the gas stream to remove approximately 80% of the fly ash.

Evaluation Criteria

5. EVALUATION CRITERIA AND PROGRAM POLICY FACTORS

5.1 INTRODUCTION

The prime consideration in the evaluation of proposals for financial assistance is to assess their merit in order to determine those proposals that offer the greatest likelihood of successfully demonstrating and subsequently commercializing emerging innovative clean coal technologies. The process of evaluation will consist of:

(a) Qualification,

(b) Preliminary Evaluation,

(c) Comprehensive Evaluation, and

(d) Consideration of Program Policy Factors.

The source selection official will select proposal(s) for award taking into account the evaluation criteria and relevant program policy factors in order to determine the mix of projects that will best further the objectives and goals of this PON.

5.2 QUALIFICATION

In order to be considered in the Preliminary Evaluation phase, a proposal must successfully pass Qualification. Failure to meet one or more of the Qualification Criteria will result in rejection of the proposal and, therefore, will preclude proceeding to Preliminary Evaluation. In the event that a proposal is rejected, a notice will be sent to the proposer stating the reason(s) that the proposal will not be considered for financial assistance under this solicitation.

The proposal must meet the following **Qualification Criteria**:

(a) The proposed demonstration project or facility (existing or new) must be located in the United States.

(b) The proposed demonstration project must be designed for and operated with coal(s). These coals must be from United States mines.

(c) The offeror must agree to provide a cost share of at least 50 percent of total project cost, with at least 50 percent in each of the three project Phases.

(d) The proposer must have access to, and use of, the proposed site and any proposed alternate site(s) for the duration of the project.

(e) The proposed project team must be identified and firmly committed to fulfilling its proposed role in the project.

(f) The offeror agrees that, if selected, it will submit a "Repayment Plan" consistent with Section 6.4 of this PON.

5.3 PRELIMINARY EVALUATION

In order to be considered in the Comprehensive Evaluation phase, a proposal must successfully pass Preliminary Evaluation. Failure to meet one or more of the Preliminary Evaluation requirements will result in rejection of the proposal and, therefore, will preclude proceeding to Comprehensive Evaluation. In the event that a proposal is rejected, a notice will be sent to the proposer stating the reason(s) that the proposal will not be considered for financial assistance under this solicitation. The requirements to pass Preliminary Evaluation are as follows:

(a) The proposal must be consistent with the objectives of this PON, as stated in Section 1.2.

(b) The proposal must contain sufficient technical, cost, and other information, as described in this solicitation, to enable Comprehensive Evaluation. Included herein is an explicit financing plan for the project and project cost information detailed to at least the project, phase and task levels.

(c) The proposal must be signed by a responsible official of the proposing organization authorized to contractually bind the organization to the performance of the Cooperative Agreement in its entirety.

5.4 COMPREHENSIVE EVALUATION

Proposals passing Preliminary Evaluation will have their Technical Proposals (Volume II), Business and Management Proposals (Volume III), and Cost Proposals (Volume IV) evaluated. The Technical Proposal evaluation is conducted to determine the relative merits of the offeror's proposal in accordance with weighted evaluation criteria. The Technical Proposal evaluation results in a numerical score for each of the evaluation criteria.

The Business and Management Proposal will be evaluated to determine the business and management performance potential of the offeror, and will be used as an aid to determine the offeror's understanding of the technical requirements of this PON. The Business and Management Proposal will be adjectively rated but not point-scored.

The Cost Proposal will be evaluated to assess whether the proposed cost is allocable, allowable, and reasonable. The Cost Proposal will also be used to assess the validity of the proposer's approach to completing the project in accordance with the proposed Statement of Work and the requirements of this PON. No point score will be applied.

5.4.1 Technical Evaluation Criteria:

The Technical Evaluation Criteria are divided into two major categories. The first, "Commercialization Factors," addresses the projected commercialization of the proposed technology. This is different from the proposed demonstration project itself. It deals with factors associated with the commercialized version of the proposed process. The criteria in this section will allow consideration of the potential of the technology to reduce emissions from existing coal-fired facilities and the cost effectiveness of the commercial technology in these applications when compared to commercially available technologies.

The second major category, "Demonstration Project Factors," deals with the proposed demonstration project itself. Criteria in "Demonstration Project Factors" will allow consideration of technical readiness for scale-up, adequacy, appropriateness and relevance of the demonstration project, the environmental, health, safety, and socioeconomic and other site-related aspects, and the reasonableness and adequacy of the technical and management approach required to execute the project.

5.4.1.1 COMMERCIALIZATION FACTORS

(a) ENVIRONMENTAL

The extent to which the proposed technology (or combination of technologies), when used at existing coal-fired facilities, can reduce total national emissions of SO_2 and/or NO_x and reduce transboundary and interstate air pollution, with minimal adverse EHSS impacts. No credit shall be given for reduced emissions in applications where currently available commercial technologies can be used to accomplish reductions at lower cost (i.e., cost per ton of pollutant removed). Additional credit shall be given for technologies that make beneficial use of the solid waste that may be generated.

(b) COST-EFFECTIVENESS

The extent to which the proposed technology, when used at existing coal-fired facilities, is likely to improve the cost-effectiveness (i.e., cost per ton of pollutant removed) of controlling emissions of SO_2 and/or NO_x, when compared to currently available commercial technology options to accomplish comparable emission reductions. The extent to which the technology affects the cost of producing electric power will be considered.

5.4.1.2 DEMONSTRATION PROJECT FACTORS

(a) TECHNICAL READINESS

Technical readiness for demonstration at the size proposed, as evidenced by the adequacy, availability, suitability, and quality of the data and analyses supporting a decision to advance the technology to demonstration scale.

(b). ADEQUACY, APPROPRIATENESS AND RELEVANCE OF DEMONSTRATION

Adequacy, appropriateness and relevance of the proposed project to contribute to the enhancement of technologies, techniques, or processes, and provide new information to enable the private sector to make rational commercialization decisions whether to employ the proposed technology at existing coal-burning facilities that contribute to transboundary and interstate air pollution.

(c) ENVIRONMENTAL, HEALTH, SAFETY, SOCIOECONOMIC (EHSS) AND OTHER SITE-RELATED ASPECTS

Adequacy and appropriateness of proposed approaches to meet and exceed all EHSS requirements during all phases of the proposed project and to mitigate the risks and impacts of the EHSS aspects of the proposed demonstration project. The suitability, quality, and adequacy of the site(s) and/or facility(ies) for the proposed demonstration project. Degree to which current emissions of SO_2 and/or NO_x are reduced, especially emissions which contribute to transboundary air pollution.

(d) TECHNICAL AND MANAGEMENT APPROACH

Reasonableness and adequacy of the technical approach of the proposer to design, construct, operate, and, if applicable, dismantle, the proposed demonstration facility. Quality and completeness of the proposer's Statement of Work (SOW) and management plan for the demonstration project.

5.4.1.3 RELATIVE IMPORTANCE OF TECHNICAL EVALUATION CRITERIA

Section 5.4.1.2, "Demonstration Project Factors," taken together, are of greater importance than the "Commercialization Factors." The "Commercialization Factors," taken together, are worth about two thirds the value of the "Demonstration Project Factors."

Within Section 5.4.1.1, "Commercialization Factors," Criteria (a) and (b) are of equal value.

Within Section 5.4.1.2, "Demonstration Project Factors," criteria (a) and (b) are of equal value, and criteria (c) and (d) are of equal value. Criteria (a) and (b) taken together account for about two thirds of the total point score for Demonstration Project Factors, while criteria (c) and (d) taken together account for the remaining (about one third) point score for Demonstration Project Factors.

5.4.2 Business and Management Evaluation Criteria:

The following business and management evaluation criteria will be applied to evaluate the Business and Management proposal (Volume III) submitted in response to this PON:

(a) FINANCIAL CONDITION, CAPABILITY TO FINANCE, AND FINANCING PLAN

Adequacy and completeness of the plan to finance the project. Financial condition and capability of the proposed funding sources to provide the proposed non-Federal share of the project.

(b) COMMITMENT TO THE PROJECT AND SUBSEQUENT COMMERCIALIZATION

Degree of priority placed by the team's management on the project and subsequent commercialization, including the extent of cost-sharing above 50 percent, especially in the early phases of the project. Included herein is the degree of project financial risk that is assumed by the offeror, as evidenced by commitment of its own funds to the project.

(c) COMMERCIALIZATION PLAN

Adequacy of the plan for bringing the technology from the demonstration to widespread commercial application in the 1990s.

(d) ORGANIZATIONAL CREDENTIALS, AVAILABILITY, AND QUALITY OF PROJECT RESOURCES

Credentials, experience and commitment of the proposer, key personnel, and other personnel (technical and administrative) and their availability as needed to support the project; along with the proposed available project resources (facilities, etc.) needed to support the project.

5.4.2.1 RELATIVE IMPORTANCE OF BUSINESS AND MANAGEMENT CRITERIA

The most important Business and Management criterion is (a), followed, in order of importance, by (c), (b), and (d). Criteria (a) and (b) together account for slightly more than half of the value of the Business and Management volume of the proposal, while criteria (c) and (d) taken together account for slightly less than half of the value of this volume.

5.4.3 Cost Evaluation Criteria:

The Cost Proposal (Volume IV) will be evaluated to determine the reasonableness, allocability, and allowability of the proposed cost.

5.4.4 Relative Importance of Proposal Volumes:

The Technical Proposal (Volume II) is of somewhat greater importance than the Business and Management (Volume III) Proposal.

The Cost Proposal (Volume IV) is of minimal importance relative to the other two volumes, except in the event that everything else is equal, then the Cost Proposal becomes very important.

5.5 PROGRAM POLICY FACTORS

Program policy factors are those factors that, while not appropriate indicators of a proposal's individual merit (e.g., technical excellence, proposer ability, and cost), are relevant and essential to the process of choosing which of the proposal(s) received and evaluated, taken together, will best achieve the program objectives and goals within the available funds for the program. The following program policy factors will be considered:

(a) The desirability of selecting projects for retrofitting and/or repowering existing coal-fired facilities that collectively represent a diversity of methods, technical approaches, and applications (including both industrial and utility).

(b) The desirability of selecting projects that collectively produce some near-term reduction of transboundary transport of emitted SO_2 and NO_x.

(c) The desirability of selecting projects that collectively represent an economic approach applicable to a combination of existing facilities that significantly contribute to transboundary and interstate transport of SO_2 and NO_x in terms of facility types and sizes, and coal types.

5.6 OTHER CONSIDERATIONS

In the project selection process, DOE will consider giving preference to projects located in states for which the rate-making bodies of those states treat the innovative clean coal technologies the same as pollution control projects or technologies.

The inclusion of this project selection consideration is intended to encourage states to utilize their authorities to promote the adoption of innovative clean coal technology projects as a means of improving the management of air quality within their areas and across broader geographical areas. Recognizing the benefits of pollution control to society, some states offer utilities more favorable rate treatment for pollution control equipment than for other utility investments. States which offer such incentives to innovative clean coal technologies may also serve to offset a portion of the additional risk inherent in demonstrations of new technologies.

The term "will consider giving preference" means that the Source Selection Official will use this consideration as a tie breaker if, after application of the evaluation criteria and the program policy factors, two projects receive identical evaluation scores and remain essentially equal in value. This consideration will not be applied if, in doing so, the regional geographic distribution of the projects selected would be altered significantly.

Since DOE recognizes that actions pending by a ratemaking body take time to implement, a state will be considered to be treating innovative clean coal technologies the same as pollution control projects or technologies if the state regulatory body has taken action that indicates that the ratemaking body intends to implement such a policy prior to DOE's funding of any affected project(s).

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Congressional Guidance

Public Law 100-446

DEPARTMENT OF THE INTERIOR AND RELATED AGENCIES APPROPRIATIONS, FISCAL YEAR 1989

Attached is a copy of Public Law 100-446, which was signed by the President on September 27, 1988.

That this transaction will not affect, diminish, or otherwise alter the payments to be made in accordance with the provisions of the Act of May 23, 1908, as amended (16 U.S.C. 500) or the Act of July 10, 1930 (16 U.S.C. 577g): *Provided further*, That the funds associated with this section shall be scored in a manner consistent with the President's request for fiscal year 1989: *Provided further*, That funds made available to the Secretary of Agriculture pursuant to this section shall be used for the necessary expenses, including support costs of National Forest System programs as follows: 6 per centum for National Forest trail maintenance; 4 per centum for National Forest Trail construction; 20 per centum for wildlife and fish habitat management; 20 per centum for soil, water, and air management; 5 per centum for cultural resource managment; 5 per centum for wilderness management; 10 per centum for reforestation; and 30 per centum for timber sales administration and management, including all timber support costs, for advanced preparation work for fiscal year 1990 and fiscal year 1991 timber sale offerings: *Provided further*, That not later than 30 days after the submission of the President's fiscal year 1990 budget, the Chief of the Forest Service shall provide a report to the House and Senate Committees on Appropriations on the final amount and distribution of funds made available under this section and shall include an assessment of National Forest resource outputs to be produced in fiscal year 1989, fiscal year 1990, and subsequent years, using funds made available under this section, and a comparison of the outputs achieved in fiscal year 1989 and proposed for fiscal year 1990, with the output levels for the program areas listed described in the Forest Service resource management plans in effect at the time of the report required by this section.

Reports

Notwithstanding the lack of authorization for payment from appropriated funds in older supplements to cooperative right-of-way construction and use agreements, the Forest Service is authorized and directed to make cash payments in lieu of payment through collection rights where it determines that an unreasonable delay has occurred or is likely to occur before the collection rights can be exercised or offsetting construction performed. In addition, the Service is authorized and directed to make cash payment of excess cost imbalances carried by cooperators which the Government has not repaid within a reasonable time period through the exercise of collection rights or by other means.

Any money collected from the States for fire suppression assistance rendered by the Forest Service on non-Federal lands not in the vicinity of National Forest System Lands shall be used to reimburse the applicable appropriation and shall remain available until expended as the Secretary may direct in conducting activities authorized by 16 U.S.C. 2101 (note), 2101-2110, 1606, and 2111.

Of the funds available to the Forest Service, $1,500 is available to the Chief of the Forest Service for official reception and representation expenses

DEPARTMENT OF ENERGY

CLEAN COAL TECHNOLOGY

For necessary expenses of, and associated with, Clean Coal Technology demonstrations pursuant to 42 U.S.C. 5901 et seq., $575,000,000 shall be made available on October 1, 1989, and shall remain available until expended: *Provided*, That projects selected

pursuant to a general request for proposals issued pursuant to this appropriation shall demonstrate technologies capable of retrofitting or repowering existing facilities and shall be subject to all provisos contained under this head in Public Laws 99-190 and 100-202 as amended by this Act.

The first paragraph under this head in Public Law 100-202 is amended by striking "and $525,000,000 are appropriated for the fiscal year beginning October 1, 1988" and inserting "$190,000,000 are appropriated for the fiscal year beginning October 1, 1988, and shall remain available until expended, $135,000,000 are appropriated for the fiscal year beginning October 1, 1989, and shall remain available until expended, and $200,000,000 are appropriated for the fiscal year beginning October 1, 1990": *Provided*, That outlays in fiscal year 1989 resulting from the use of funds appropriated under this head in Public Law 100-202, as amended by this Act, may not exceed $15,500,000: *Provided further*, That these actions are taken pursuant to section 202(b)(1) of Public law 100-119 (2 U.S.C. 909). 101 Stat. 1324-240

For the purposes of the sixth proviso under this head in Public Law 99-190, *funds derived by the Tennessee Valley Authority from* its power program are hereafter not to be precluded from qualifying as all or part of any cost-sharing requirement, except to the extent that such funds are provided by annual appropriations Acts: *Provided*, That unexpended balances of funds made available in the "Energy Security Reserve" account in the Treasury for The Clean Coal Technology Program by the Department of the Interior and Related Agencies Appropriations Act, 1986, as contained in section 101(d) of Public Law 99-190, shall be merged with this account: *Provided further*, That for the purposes of the sixth proviso in Public Law 99-190 under this heading, funds provided under section 306 of Public Law 93-32 shall be considered non-Federal: *Provided further*, That reports on projects selected by the Secretary of Energy pursuant to authority granted under the heading "Clean coal technology" in the Department of the Interior and Related Agencies Appropriations Act, 1986, as contained in Public Law 99-190, which are received by the Speaker of the House of Representatives and the President of the Senate prior to the end of the second session of the 100th Congress shall be deemed to have met the criteria in the third proviso of the fourth paragraph under the heading "Administrative provisions, Department Energy" in the Department of the Interior and Related Agencies Appropriations Act, 1986, as contained in Public Law 99-190, upon expiration of 30 calendar days from receipt of the report by the Speaker of the House of Representatives and the President of the Senate. 42 USC 5903d note

Reports

FOSSIL ENERGY RESEARCH AND DEVELOPMENT

For necessary expenses in carrying out fossil energy research and development activities, under the authority of the Department of Energy Organization Act (Public Law 95-91), including the acquisition of interest, including defeasible and equitable interests in any real property or any facility or for plant or facility acquisition or expansion, $380,595,000, to remain available until expended, of which $249,000 is for the functions of the Office of the Federal Inspector for the Alaska Natural Gas Transportation System established pursuant to the authority of Public Law 94-586 (90 Stat. 2908-2909), and pursuant to section 111(b)(1)(B) of the Energy Re-

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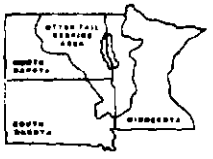

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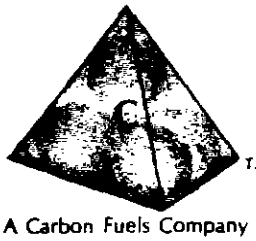

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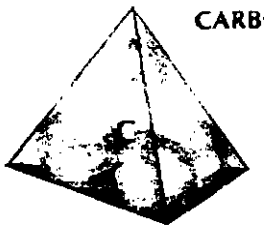

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